Hy-Brid Lifts™
by Custom Equipment

MAINTENANCE AND TROUBLESHOOTING MANUAL

Hy-Brid Lifts
Model
HB-830CE

Self-Propelled
Aerial Work Platform

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Revision Table:
Revision A (06/29/2010): Initial Release
Revision J (10/24/2012): Revised logos

Original instructions are written in English

Foreword

The purpose of this Maintenance Manual is to provide qualified service personnel with information for servicing and maintaining Hy-Brid Lifts. All information in this manual must be read and understood before any attempt is made to service this machine.

The operation and safety manual is considered a part of the work platform and contains instructions and operating procedures essential to properly and safely operate the Custom Equipment Hy-Brid Lift. Users must read and understand all information in the Safety and Operations Manual before operation.

DANGER

THE OPERATION AND SAFETY MANUAL MUST BE READ AND UNDERSTOOD PRIOR TO OPERATING THE MACHINE.

THE USER/OPERATOR SHOULD NOT ACCEPT OPERATING RESPONSIBILITY UNTIL THE MANUAL HAS BEEN READ AND UNDERSTOOD AS WELL AS HAVING OPERATED THE LIFT UNDER SUPERVISION OF AN EXPERIENCED AND QUALIFIED OPERATOR.

BECAUSE THE MANUFACTURER HAS NO DIRECT CONTROL OVER MACHINE APPLICATION AND OPERATION, PROPER SAFETY PRACTICES ARE THE RESPONSIBILITY OF THE USER AND ALL OPERATING PERSONNEL.

WARNING

ANY MODIFICATION ON THIS MACHINE WITHOUT THE EXPRESS WRITTEN CONSENT OF THE MANUFACTURER IS PROHIBITED.

If there is a question on application and/or operation, contact:

Custom Equipment, Inc.
2647 Hwy 175
Richfield, WI 53076
USA
Phone: 262-644-1300
Fax: 262-644-1320
www.hybridlifts.com

Safety

Safety Symbols

DANGER FAILURE TO FOLLOW THIS WARNING WILL CAUSE DEATH OR PERSONAL INJURY.	"DANGER" indicates an imminently hazardous situation, which, if not avoided, *will* result in death or serious injury.
WARNING FAILURE TO FOLLOW THIS WARNING MAY CAUSE DEATH OR PERSONAL INJURY.	"WARNING" indicates a potentially hazardous situation, which, if not avoided, *could* result in death or serious injury
CAUTION FAILURE TO FOLLOW THIS WARNING MAY CAUSE INJURY OR DAMAGE EQUIPMENT	"CAUTION" indicates a potentially hazardous situation which, if not avoided, *could* result in minor or moderate injury or damage to equipment

General Rules and Precautions

Custom Equipment, Inc. designed the Hy-Brid Lift self-propelled scissor lift to be safe and reliable. It is intended for elevating personnel, along with their necessary tools and materials to overhead work locations.

Vibration does not create significant hazards on this machine.

An operator of any type of work platform is subject to certain hazards that cannot be protected by mechanical means. It is therefore essential that operators be competent, careful, physically and mentally fit and thoroughly trained in safe operation of this machine.

Although Custom Equipment, Inc. conforms to specified EN: 280 requirements, it is the responsibility of the owner to instruct operators with the safety requirements made not only by Custom Equipment, Inc., but by the various safety boards in your area, as well as additional requirements set forth by EN: 280 If you come across a situation that you think might be unsafe, stop the platform and request further information from qualified sources before proceeding.

WARNING

MAINTENANCE INFORMATION IS FOR USE BY TRAINED PERSONNEL ONLY

WARNING

NEVER REACH BETWEEN SCISSORS LINKS OR PROP UP PLATFORM UNLESS MAINTENANCE PINS ARE IN PLACE.

Stability Testing

The HB-830CE has been stability tested to standards EN280 or AS 14180. The most adverse stability test is the traveling forward configuration. The overturning moment created by the test loads and forces is equivalent to a test on an unloaded machine on a level surface, as shown in the figure below. For the HB-830CE, the test weight/pull force is 50.3 kg /111 lb.

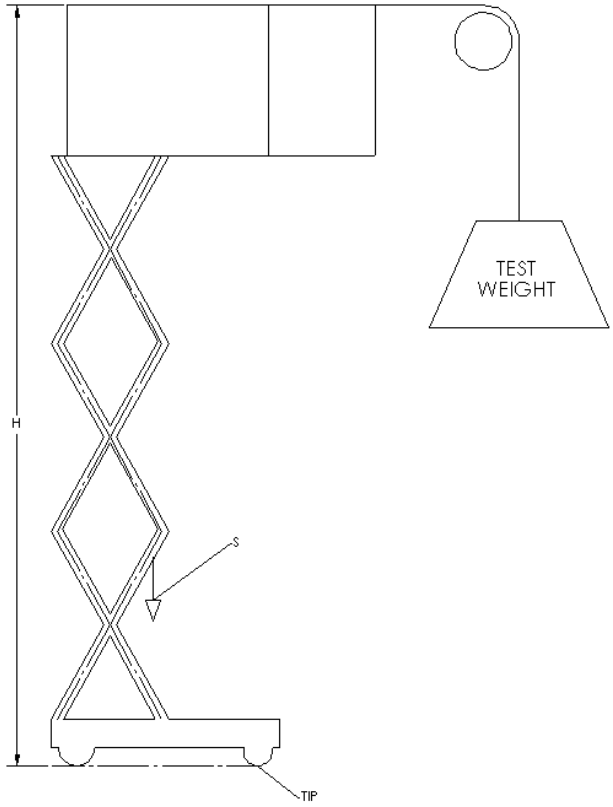


Figure 1: Stability Testing, Equivalent

Maintenance Lock

The maintenance lock must be placed into position whenever the machine is being serviced in the raised or partially raised position. Serious injury and/or death could result if maintenance lock is not used properly.

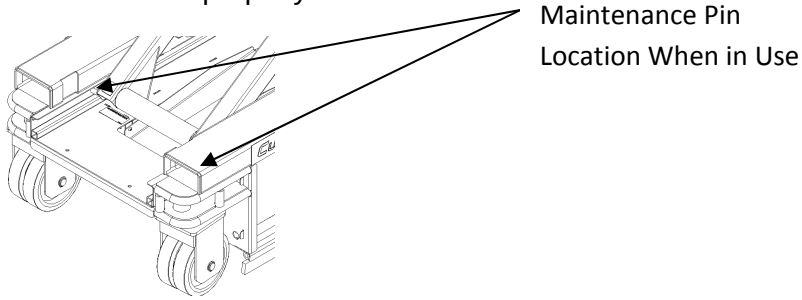


Figure 2: Maintenance Lock Pin Use

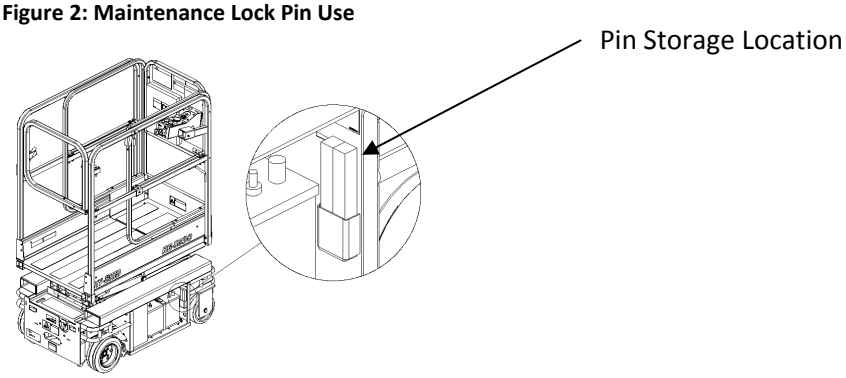


Figure 3: Maintenance Lock Pin Storage

Maintenance

WARNING

FAILURE TO COMPLY WITH THE LISTED SAFETY PRECAUTIONS MAY RESULT IN MACHINE DAMAGE, PERSONNEL INJURY OR DEATH.

- Never work under an elevated platform until maintenance locks have been engaged.
- Remove all rings, watches, and jewelry when performing any maintenance.
- Do not wear long hair unrestrained or loose fitting clothing and neckties which may become caught on or entangled in equipment.
- Observe and obey all warnings and cautions on machine and in manual.
- Keep oil, grease, water, etc. wiped from standing surfaces and handholds.
- Before making any adjustments, lubricating or performing any other maintenance, shut off all power controls.
- Battery should always be disconnected during replacement of electrical components.
- Keep all support equipment and attachments stowed in their proper place.
- Use only approved nonflammable cleaning solvents.
- After maintenance, inspect the machine as described for Pre-delivery.

Battery Maintenance

This unit is equipped with deep cycle 12-volt batteries. The care and maintenance of your battery has much to do with how well this unit functions. Battery wiring and water level should be checked monthly. **Do not overfill.** When the cells are too full, fluid will seep out when charging. The solution is at its proper strength when the battery is manufactured. Use distilled water and keep fluid up to proper level. When required, water should be added to battery after charging, unless water level is below the plates.

- Remove battery cabinet cover.
- Remove battery caps and check fluid level.
- Fill each cell (if needed) to split ring with distilled water.
- Reinstall caps.
- Wash all dirt, debris, acid, etc., off battery whenever corrosion is detected. Use a solution of 5-tsp. baking soda per quart of warm water.
- Coat terminals with a commercially available coating.

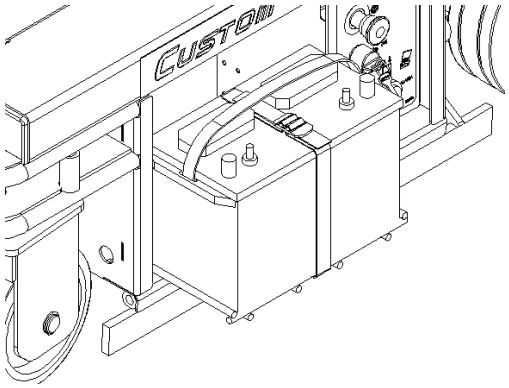


Figure 4: Battery Maintenance

CAUTION

NEVER ADD ACID TO BATTERY!

Charging the Battery

This unit is equipped with deep cycle 12-volt batteries. The care and maintenance of your battery has much to do with how well this unit functions. Battery wiring and water level should be checked monthly. **Do not overfill.** When the cells are too full, fluid will seep out when charging.
Note: The surrounding temperature greatly affects the power reserve within a battery.
Example: A battery that is 100% charged at 80° F (27°C) drops to 65% at 32°F (0°C) At 0°F (-18°C), this battery will drop to 40% efficiency.

WARNING

LEAD-ACID BATTERIES GENERATE EXPLOSIVE GASES. KEEP SPARKS AND FLAME AWAY FROM BATTERIES. DO NOT SMOKE WHILE CHARGING.

- Park the machine on a level surface.
- Plug charger into AC outlet until charged.
- Unplug charger.

The charger will not begin charging on severely discharged batteries. This will be evident by the three indicators blinking simultaneously.

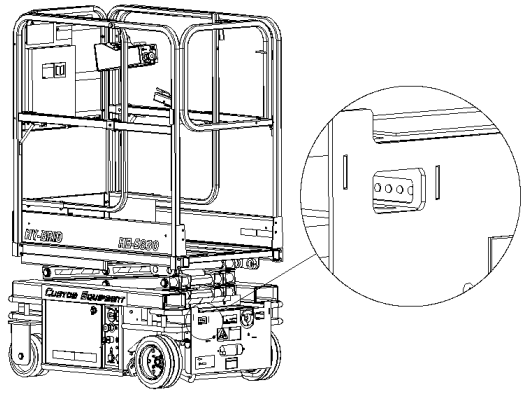


Figure 5: Battery Charger LED Display

Charger LED Display / Charging State	50%	75%	100%	GEL
0 to 50% charged	Blinking	Off	Off	NA
50% to 75% charged	On	Blinking	Off	NA
75% to 100% charged	On	On	Blinking	NA
100% charged	On	On	On	NA
Charge for flooded type batteries	NA	NA	NA	Off
Charge for Sealed type batteries	NA	NA	NA	On
Abnormal Cycle	Off	Off	Blinking	NA

WARNING

DO NOT OPERATE UNIT WHILE CHARGING.
DO NOT DISABLE CHARGER INTERLOCK.

CAUTION

NEVER ADD ACID TO BATTERY!

The solution is at its proper strength when the battery is manufactured. Use distilled water and keep fluid up to proper level. When required, water should be added to battery after charging, unless water level is below the plates.

Lubrication

Item	Specification	Frequency of Lubrication
Wheels	Teflon Spray	Quarterly

Components requiring adjustment

Under normal use, no components should require adjustment. Contact the manufacturer if adjustments are required.

Examination, repair, replacement of limited life components

With proper use, battery maintenance, and regular inspection, there are no limited life components that require routine replacement.

Safety devices and systems requiring checks

Check safety functions as part of daily inspection. Check that the electromagnetic brakes are holding.

Storage

After periods of storage, exposure to extremes of ambient conditions-heat, cold, moisture, dust etc. inspect the machine. Refer to the Pre-Delivery/ Frequent Inspection Checklist in the Maintenance Manual.

Major Alterations or Repairs

Any alterations must be approved by the manufacturer. Major repairs, which affect the stability, strength, or performance of the machine must also be approved by the manufacturer, recorded, and include machine inspection and testing. Never attach pipe racks, material lifting devices, or make any other alteration that is not part of the intended design of the machine.

Inspection and Regular Maintenance Checklists

CAUTION

FAILURE TO PERFORM INSPECTIONS AND PREVENTITIVE MAINTENANCE AT RECOMMENDED INTERVALS MAY RESULT IN THE UNIT BEING OPERATED WITH A DEFECT THAT MAY RESULT IN INJURY OR DEATH OF THE OPERATOR.

Regular inspection and conscientious maintenance is important to efficient economical operation of this machine. It will help to assure that equipment will perform satisfactorily with a minimum of service and repair. Make checks at the stated intervals or more frequently if required by local operating conditions. The following inspection checklists are required and included in this manual:
Pre-Start (Required before operation at each work shift)
Monthly Battery Maintenance
Frequent (Required at intervals not more than three months)
Pre-Delivery/Annual (Required at intervals not more than twelve months)

The rated life of the machine is Light Intermittent Duty (typical use 10 years, 40 weeks per year, 20h per week, 5 load cycles per h).

Monthly Battery Care

WARNING

THIS CHECKLIST MUST BE USED AT MONTHLY OR AFTER EVERY 100 HOURS OF USE. FAILURE TO DO SO COULD AFFECT THE SAFETY OF THE OPERATOR.

MODEL NUMBER _____ *SERIAL NUMBER* _____

1. Keep inspection records up-to-date.
2. Record and report all discrepancies to your supervisor.
3. A dirty machine cannot be properly inspected.

Y-Yes/Acceptable N-No/Unacceptable R-Repaired

Description	Y	N	R
Monthly Battery Care: 1. Remove battery cabinet cover. 2. Remove battery caps and check fluid level. 3. Fill each cell (if needed) to split ring with distilled water. 4. Reinstall caps. 5. Wash all dirt, debris, acid, etc., off battery whenever corrosion is detected. Use a solution of 5-tsp. baking soda per quart of warm water. 6. Coat terminals with a commercially available coating.			

Prestart Inspection Checklist

WARNING

THIS CHECKLIST MUST BE USED AT THE BEGINNING OF EACH SHIFT OR AFTER EVERY SIX TO EIGHT HOURS OF USE. FAILURE TO DO SO COULD AFFECT THE SAFETY OF THE OPERATOR.

MODEL HB-830CE *SERIAL NUMBER* _____

1. Keep inspection records up-to-date.
2. Record and report all discrepancies to your supervisor.
3. A dirty machine cannot be properly inspected.

Y-Yes/Acceptable N-No/Unacceptable R-Repaired

Description	Y	N	R
Visual Inspections			
Check that there are no damaged, dented, or bent structural members.			
There are no loose or missing parts.			
Check that warning and instructional labels are legible and secure. Ensure that load capacity is clearly marked.			
Check the platform rails and safety gate for damage.			
Platform and base controls are not missing, damaged, or disconnected.			
Electrical cables and wires are not torn, frayed, or disconnected.			
Hydraulic hoses are not torn or loose, and there are no leaks. Check that hoses and the cables have no worn areas or chafing.			
Check the hydraulic fluid level with the platform fully lowered.			
Check the tires for damage. Check that wheel axle retaining rings and set screw in rear wheel are tight.			
Check that all snap rings are secure in grooves on pivot pins.			
Functional Tests			
Gate closes automatically and latches (alignment can be adjusted with screw on toe board or railing if necessary).			
Platform Controls: Check all switches and push buttons for proper operation. Emergency Stop (Stops all movement) Drive Enable (Must be activated to drive) Joystick (Return to neutral, drives forward, reverse, left, right) Lift Enable (Must be activated to elevate) Rocker Switch (Elevates, Lowers) Horn Tilt & Overload LED Indicators			
Base Controls: Check all switches and push buttons for proper operation. Emergency Stop (Stops all movement) Key Switch (Selects Platform Control, Ground Control, or Off) Up/Down Rocker Switch (Elevates, Lowers) Hour meter (Displays Drive Hours) Alarms (Not damaged, sounds for descent, overload) LED (Flashes when overloaded)			
Wheels: Front and rear wheels rotate, pivot freely.			
Drives in slow speed when elevated.			
Brakes: Machine stops when joystick released.			
Pothole guards deploy and lock when platform is raised.			
Lift does not elevate when pothole guards are blocked.			

DATE _____ INSPECTED BY _____

Frequent Inspection Checklist

WARNING

AERIAL PLATFORMS SHALL BE INSPECTED, SERVICED AND ADJUSTED TO MANUFACTURER'S REQUIREMENTS BY A QUALIFIED MECHANIC PRIOR TO EACH SALE, LEASE, OR RENTAL, AND EVERY 3 MONTHS OR 150 HOURS, WHICHEVER COMES FIRST.

MODEL NUMBER _____ *SERIAL NUMBER* _____

- Check each item listed below.
- Use proper operating, service, and maintenance manual for specific information and settings
- If an item is found to be unacceptable make the necessary repairs and check the "repaired" box.
- When all items are "acceptable", the unit is ready for service.

Description	Y	N	R
Visual Inspections			
Perform all checks on the Pre-Start Inspection Checklist.			
Inspect the condition of hydraulic fluid in reservoir. Oil should have a clear amber color.			
Inspect the entire machine for signs of damage, broken welds, loose bolts, or improper repairs. (Check for corrosion, cracking, abrasion, etc.)			
Check that all snap rings are secure in grooves on pivot pins.			
Check if tires are leaning in or out.			
Check electrical motor brushes (every 150 hours)			
Verify that maintenance and inspection records are up to date.			
Functional Tests			
Perform all checks on the Pre-Start Inspection Checklist.			
Functions operate smoothly.			
Functions operate over full range of motion.			
Elevated and Lowered drive speeds do not exceed specifications listed in Operators manual.			
Emergency Lowering—Manual override functions properly.			
Ground Controls override platform controls.			
Check that the platform does not drift down with a full load.			
Wheels lubricated if needed.			
Comments:			

DATE _____ INSPECTED BY _____

Pre-Delivery/Annual Inspection Checklist

WARNING

AERIAL PLATFORMS SHALL BE INSPECTED, SERVICED AND ADJUSTED TO MANUFACTURER'S REQUIREMENTS BY A QUALIFIED MECHANIC PRIOR TO EACH SALE, LEASE, OR RENTAL, AND EVERY 12 MONTHS.

MODEL NUMBER: HB-830CE SERIAL NUMBER _____

- Check each item listed below.
- Use proper operating, service, and maintenance manual for specific information and settings
- If an item is found to be unacceptable make the necessary repairs and check the "repaired" box.
- When all items are "acceptable", the unit is ready for service.

Check	Y	N	R	Check	Y	N	R
Base:							
Inspect roller tracks for damage				**Decals:**			
All frame bolts tight				Legibility			
Pump Secure				Correct capacity noted			
DC motors secure				Proper placement quantity			
Battery Hold Downs Secure				**Wiring:**			
Batteries Fully Charged				Switches secure			
Wheels: Snap Rings Secure				Contactor(s) secure			
Wheels: Bolts/Nuts Tight				Tight on terminals (No loose wiring)			
Maintenance Locks: Pins in cabinet				**Functions:**			
All Shields/Guards in place				Drive, Lift, Steer Functions Operational			
Hydraulic Oil Level 1" from top				Emergency Stop Breaks Circuits			
Check all hydraulic hoses for leaks				Slow Speed limit switch Set properly			
Check all hydraulic fittings for leaks				Emergency Down Operational			
Scissors:				Pothole guards deploy when platform			
Broken Welds				Pothole interlock functions correctly			
Bent Beam Members				Brakes: Operational			
All rollers Turn Freely				Tilt sensor Functional			
Ret. Rings Secure On Pivots				Warning Horn Alarms			
Broken welds				Motion Alarms Functional			
Platform:				Hour meter operational			
All rails in place/secure				Battery indication operational			
No bent rails				Verify Overload Calibration			
No broken welds				Battery Charger Secure/Operational			
110V outlet safe/working (if installed)							
Entrance gate Closes Freely							
Operator/Service Manual Included							
Cables in place/secure							
Extending platform extends freely							
Extending platform Locks in Stowed Position							
Extending platform Locks in Extended Position							
Comments:							

DATE _____ INSPECTED BY _____

Technical References

Joystick Service Flash Codes

	The amber Service Indicator LED displays diagnostic codes.

A sequence of flashes, separated by a pause, followed by a repetition of the sequence. The number of flashes indicates a condition.

Flash Code	Description	Notes
1	User Fault	Possible stall timeout or user error. Release the joystick to neutral and try again.
2	Battery Fault	Try charging batteries. Batteries may require replacing. Check batteries and cables.
3	Left Motor Fault	Check left motor, connections, and cabling
4	Right Motor Fault	Check right motor, connections, and cabling.
5	Left Park Brake Fault	Check left park brake, connections, and cabling.
6	Right Park Brake Fault	Check the right park brake, connections and cabling
7	Remote Fault	Check the Communications Bus connectors and wiring. Replace the Remote (Joystick).
8	Power Module Fault	Check the Communications Bus connectors and wiring. Replace the Power Module.
9	Communications Fault	One cause of this error is when the unit is powered down without turning off the joystick (i.e. using the emergency stop). To clear, with the machine on (using the key switch), turn the joystick off and back on (joystick on/off button). Check that battery voltage is greater than 17V. Check the Bus Cable. Replace the Power Module. Replace the Remote (Joystick).
10	Unknown Fault	Check all connections and wiring. Contact manufacturer.
11	Incompatible Remote	The Remote is incompatible with the Power Module. Ensure that the correct part number is used.

See also “Upper Control Battery Gauge Indicator” codes listed in the Operator’s Manual.

Control Module—GP102 Help Messages

When the EZcal hand-held device is connected to the GP102 control module, the first menu available is "HELP" – just press the ENTER button to see a message describing the current status of the GP102; this can be very helpful in diagnosing problems with the system. When an EZcal is unavailable, an LED on the GP102 flashes to provide limited diagnostics (see Appendix Four).

The following messages might be displayed:

EVERYTHING OK

The GP102 is in platform mode and detects no problems. If problems are being experienced with the system, use the DIAGNOSTICS menus to check for faulty sensors and/or switches. LED on steady.

IN GROUND MODE!

The GP102 is in ground mode and detects no problems. IMPORTANT: Normally the overload cutout system is inhibited in ground mode. The vehicle should not be used to raise heavy loads in ground mode, in case the platform is overloaded. LED on steady.

ARMGUARD ACTIVE!

The GP102 has stopped descent at the Armguard height, and is delaying to "give the operator the opportunity to see whether persons … could be injured" (per EN 280 5.4.4). Vehicle movement will continue to be stopped after the delay until all functions are released. LED flash code 4.

B+ SUPPLY TOO LOW

The GP102 is designed for use on 12V and 24V battery powered vehicles; it cannot operate with a supply below about 9V. The "BATTERY" voltage can be checked in the "SENSORS" menu (available in the "DIAGNOSTICS" menu). LED flash code 7.

DRIVE/LIFT SELECT INPUTS FAULTY!

Neither the drive select (P2-7) nor the lift select (P2-8) input is active, or both are active – the GP102 cannot determine the vehicle use. All vehicle operation will be prevented until the problem is corrected. LED flash code 2.

ELEVATION SWITCH SHIFTED?

The GP102 uses the elevation switch in combination with the height sensor to ensure correct functionality of both; any of the following faults may be detected:

- The elevation switch should change state near the point at which it did during load calibration All vehicle operation will be prevented until the problem is corrected. LED flash code 4.

ELEVATION SWITCH STUCK?

The GP102 uses the elevation switch in combination with the height sensor to ensure correct functionality of both; any of the following faults may be detected:

- When the platform is elevated, the measured height should be above that stored during load calibration.
- When the platform is not elevated, the measured height should be below that stored during load calibration. All vehicle operation will be prevented until the problem is corrected. LED flash code 4.

EMS INPUTS FAULTY!

The EMS platform (P2-1) and EMS ground (P2-2) inputs are either both active or both inactive – the GP102 cannot determine whether to be in platform or ground mode. All vehicle operation will be prevented until the problem is corrected. LED flash code 2.

FACTORY OVERRIDE

To allow vehicle movement during manufacture, the GP102 is delivered in a "FACTORY OVERRIDE" state which disables all functionality. The first load calibration (even if not completed) will terminate this state. LED flash code 15.

FAULT: BAD TILT SENSOR

The GP102 has detected that its integral tilt sensor is faulty – the module may need to be replaced. IMPORTANT: If the GP102 is installed incorrectly, this fault may occur erroneously. LED flash code 8.

HEIGHT NOT CALIBRATED

During the first phase of load calibration ("DYNAMIC"), the GP102 calibrates the minimum and maximum output of the height sensor so that platform height can be determined. This calibration must be successfully completed! LED flash code 1.

IDLE TIMEOUT ACTIVE!

If configured, the GP102 will turn off all its outputs after a set time with no vehicle functions operated; this saves battery power and silences any alarm still sounding when the vehicle was left. Any vehicle function will end the idle timeout and restore normal operation of the GP102 outputs. LED stays off.

INVALID HEIGHT – CHECK SENSORS

There is a problem which prevents the vehicle height being determined; there may be a fault with the height sensor, or the vehicle may have been modified or damaged since the last calibration occurred. All vehicle operation will be prevented until the problem is corrected. LED flash code 9.

INVALID LOAD – CHECK SENSORS

There is a problem which prevents the estimated load being determined; there may be a fault with the height sensor or the load sensor, or the vehicle may have been modified or damaged since the last calibration occurred. All vehicle operation will be prevented until the problem is corrected. LED flash code 6.

LOAD NOT CALIBRATED

During the second and third phases of load calibration ("LOADED" and "EMPTY"), the GP102 calibrates the lift cylinder pressure at various heights corresponding to a fully loaded and unloaded platform. This calibration must be successfully completed! LED flash code 1.

NO LAST CALDATE!

At the end of load calibration, the GP102 prompts for entry of the current date to aid in vehicle maintenance. A non-zero date must be entered! When load (re)calibration is begun, the last CALDATE is erased and cannot be re-entered until calibration is completed; this ensures that a partly calibrated vehicle cannot be operated. LED flash code 1.

P3-4 SHORT TO 0V?

The GP102 startup tests detected that something is overloading the output on P3-4. All vehicle operation will be prevented until the problem is corrected. LED flash code 5.

P3-4 SHORT TO SUPPLY?

The GP102 startup tests (or the continuous monitoring during any prevention of vehicle movement) detected that something is providing a permanent supply on P3-4 (defeating the internal cutout). All vehicle operation will be prevented until the problem is corrected. LED flash code 3.

P3-6 SHORT TO 0V?

The GP102 startup tests detected that something is overloading the output on P3-6. All vehicle operation will be prevented until the problem is corrected. LED flash code 5.

P3-6 SHORT TO SUPPLY?

The GP102 startup tests detected that something is providing a permanent supply on P3-6 (defeating the internal cutout). All vehicle operation will be prevented until the problem is corrected. LED flash code 3.

P4-1 OR P5-1 SHORT TO 0V?

The GP102 startup tests detected that something is overloading the 5V supply provided on P4-1 or P5-1. All vehicle operation will be prevented until the problem is corrected. LED flash code 7.

TESTING HWFS

When the GP102 is powered up, it carries out various tests to ensure that it is functioning safely.

TOO HIGH – DRIVE PREVENTED

A drive function has been selected but the platform is raised above the "MAX DRIVE" setting. The drive function will be prevented until the platform is lowered. LED flash code 8.

TOO HIGH – LIFT UP PREVENTED

The lift/up function has been selected but the platform is raised above the "MAX LIFT" setting. The lift/up function will be prevented until the platform is lowered. LED flash code 8.

UP/DOWN SELECT INPUTS ACTIVE TOGETHER!

The up select (P2-3 and/or P2-5) and the down select (P2-4 and/or P2-6) are active together – the GP102 cannot determine the vehicle use. All vehicle operation will be prevented until the problem is corrected. LED flash code 2.

VEHICLE OVERLOADED

The estimated load in the platform exceeds the "OVERLOAD AT" setting in the "ADJUSTMENTS" "LOAD" menu. The GP102 will activate the cutout to prevent vehicle operation until the platform load is reduced. LED flash code 8.

VEHICLE TILTED

Either the "X" or "Y" tilt (measured by the GP102 integral tilt sensor) exceeds the "X TRIP" or "Y TRIP" setting in the "ADJUSTMENTS" "TILT" menu. LED flash code 8.

WAITING FOR B+ ON P2-12

The supply on P2-12 provides power for the outputs P3-1/2/3/4. The GP102 cannot function if the supply is not present. Since the supply on P2-12 is switched to P3-4, vehicle operation will be prevented. LED flash code 7.

WAITING FOR NEUTRAL

When the GP102 is powered up, all controls must be in neutral to allow safe testing of the failsafe output; no functions are allowed until testing is complete. LED flash code 2.

Control Module Flash Codes

The GP102 has a built-in LED to provide simple diagnostics when no EZcal is available. Please note that the use of an EZcal provides significantly better diagnostics through the HELP messages (see Appendix Three). An EZcal is also necessary to calibrate a GP102.

LED on steady

This indicates no fault with the GP102

LED off always

This indicates no power to the GP102, or idle timeout – activate a lift or drive function to cancel the idle timeout.

LED flash code 1

This indicates the GP102 has not been properly calibrated.

LED flash code 2

This indicates a fault with the switch inputs to the GP102. Check wiring to connector P2.

LED flash code 3

This indicates a fault with the shutdown outputs of the GP102 – a short to the supply has been detected. Check wiring from pins P3-4 and P3-6.

LED flash code 4

This indicates that armguard is active, or that there is a fault with the elevation switch – the GP102 verifies correct opening and closing of the elevation switch against the height sensor. Checking the elevation switch on P2-10. If the height sensor has been adjusted or replaced, repeat the CALIBRATE HEIGHT procedure.

LED flash code 5

This indicates a fault with the shutdown outputs of the GP102 – a short to 0V (ground) has been detected. Check wiring from pins P3-4 and P3-6.

LED flash code 6

This indicates a fault with the load measurement – check the pressure transducer and wiring from it to connector P4.

LED flash code 7

This indicates a fault with the supply to the GP102 – check battery supply at least 8V on pin P2-12; also check that there is not a short to 0V (ground) on pin P4-1. If load cells or strain gauges are connected to P5A/P5B/P6A/P6B, disconnect them – if the fault changes then one or more is shorting the supply on each pin 1.

LED flash code 8

This is not a fault – it indicates the GP102 has prevented a function; functions can be prevented if the platform is overloaded, if the machine is tilted too far, or if the platform is too high.

LED flash code 9

This indicates a fault with the height measurement – check the height transducer (EZfit) and wiring from it to connector P4.

LED flash code 10

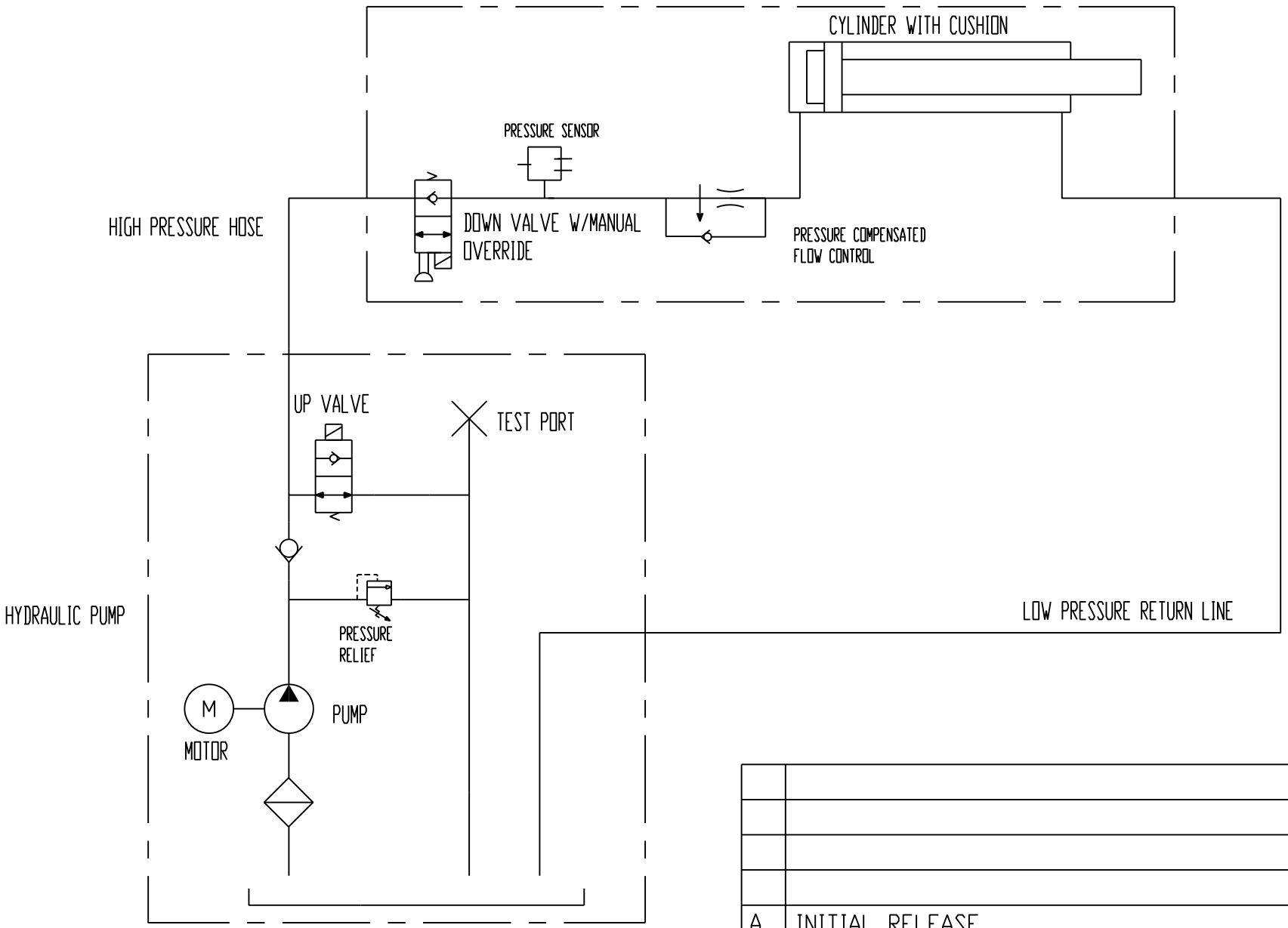
This indicates the GP102 is carrying out startup tests.

LED flash code 15

This indicates the GP102 is in “FACTORY OVERRIDE” (see Appendix Nine) and overload functions are disabled – this aids manufacture by allowing vehicle movement before the machine is built sufficiently to be calibrated.

Part No: HS-HB-830CE

Part #SUPO-613E
REV J



No.	Revision	Date
A	INITIAL RELEASE	05/03/10

Welding Tolerances: .X = ± .060 .XX = ± .030 .XXX = ± .010

Machining Tolerances: .X = ± .030 .XX = ± .015 .XXX = ± .005

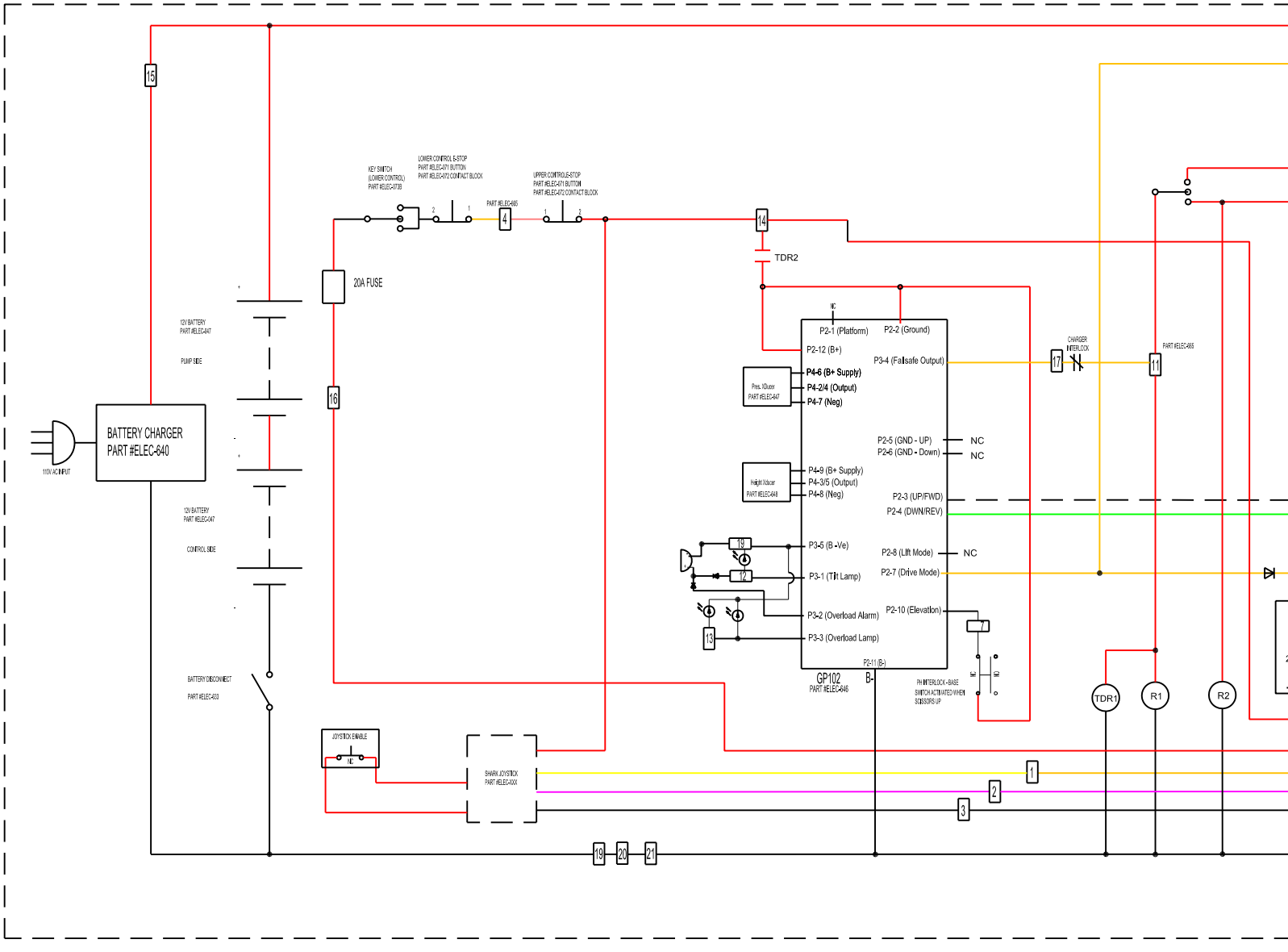
Custom Equipment, Inc. West Bend, WI 53095

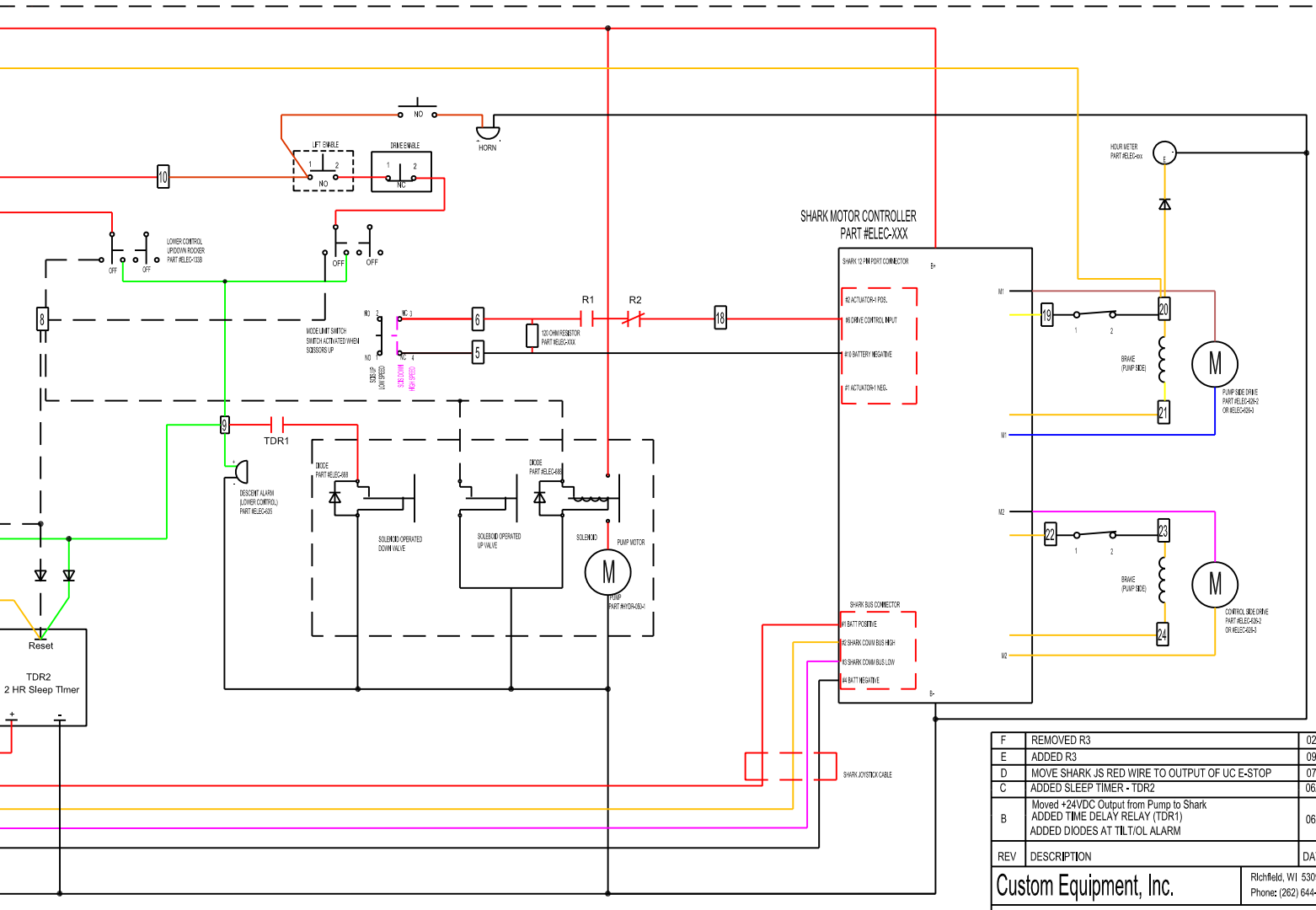
Part No: HS-HB-830CE

DO NOT SCALE HB-S830CE

Date: 5/3/10 A-Size

Hydraulic Schematic HS-HB-830CE


BATTERY CHARGER
PART #ELEC-640
110V AC INPUT
12V BATTERY
PART #ELEC-647
PUMP SIDE
12V BATTERY
PART #ELEC-647
CONTROL SIDE
BATTERY DISCONNECT
PART #ELEC-633
20A FUSE
KEY SWITCH
(LOWER CONTROL)
PART #ELEC-3705
LOWER CONTROL E-STOP
PART #ELEC-471 BUTTON
PART #ELEC-472 CONTACT BLOCK
PART #ELEC-485
UPPER CONTROL E-STOP
PART #ELEC-471 BUTTON
PART #ELEC-472 CONTACT BLOCK
TDR2
P2-1 (Platform)
P2-2 (Ground)
P2-12 (B+)
P3-4 (Failsafe Output)
P4-6 (B+ Supply)
P4-2/4 (Output)
P4-7 (Neg)
Pres. XDucer
PART #ELEC-647
P2-5 (GND - UP)
P2-6 (GND - Down)
NC
NC
P4-9 (B+ Supply)
P4-3/5 (Output)
P4-8 (Neg)
Height XDucer
PART #ELEC-649
P2-3 (UP/FWD)
P2-4 (DWN/REV)
P3-5 (B -Ve)
P3-1 (Tilt Lamp)
P2-8 (Lift Mode)
NC
P2-7 (Drive Mode)
P3-2 (Overload Alarm)
P3-3 (Overload Lamp)
P2-10 (Elevation)
P2-11 (B-)
GP102
PART #ELEC-646
B-
PH INTERLOCK - BASE
SWITCH ACTIVATED WHEN
SCISSORS UP
CHARGER
INTERLOCK
PART #ELEC-686
JOYSTICK ENABLE
NC
SHARK JOYSTICK
PART #ELEC-XXX
TDR1
R1
R2



REV	DESCRIPTION	DATE
F	REMOVED R3	02/24/11
E	ADDED R3	09/14/10
D	MOVE SHARK JS RED WIRE TO OUTPUT OF UC E-STOP	07/22/10
C	ADDED SLEEP TIMER - TDR2	06/23/10
B	Moved +24VDC Output from Pump to Shark ADDED TIME DELAY RELAY (TDR1) ADDED DIODES AT TILT/OL ALARM	06/15/10

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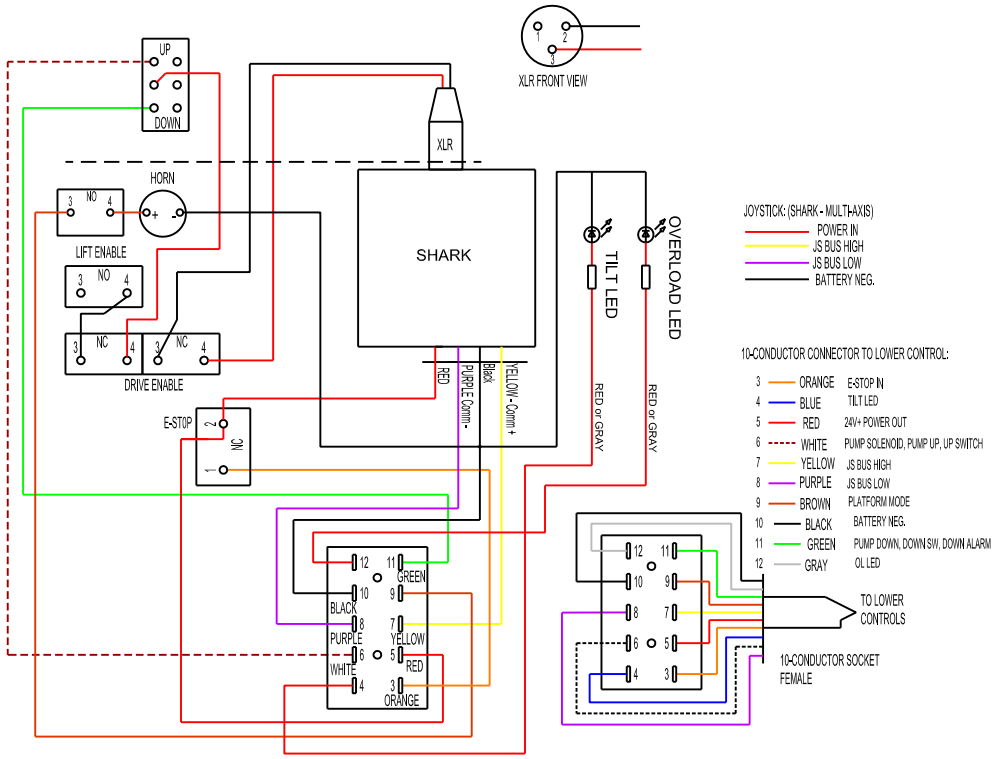
Phone: (262) 644-1300

WIRING SCHEMATIC HB-830CE

Part No: WD-1002100194-WS-1002100194



REV	DESCRIPTION	DATE
D	MOVE SHARK JS RED WIRE FROM LIFT ENABLE TO E-STOP CONTACT	07/22/2010
C	MOVE OL RED WIRE FROM CONN. PLUG TERM #4 TO TERM. #12 MOVE TILT LED RED WIRE FROM CONN. PLUG TERM #12 TO TERM. #4	07/19/2010
B	MOVE SHARK RED WIRE FROM E-STOP TO LIFT ENABLE	06/23/2010
A	INITIAL RELEASE	05/03/2010

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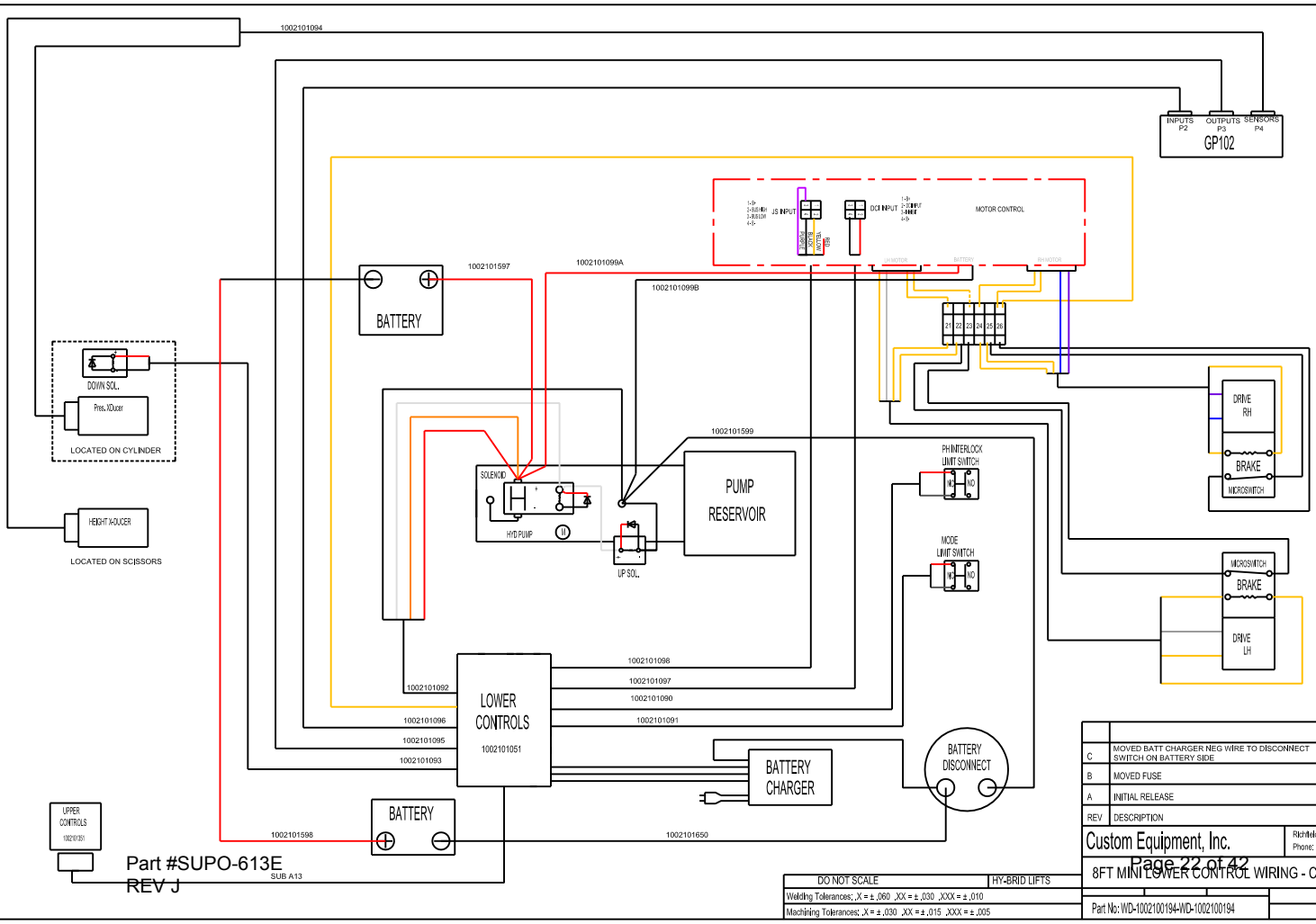
UPPER CONTROL WIRING-8FT MINI-CE

DO NOT SCALE | HY-BRID LIFTS

Welding Tolerances: .X = ± .060 .XX = ± .030 .XXX = ± .010

Machining Tolerances: .X = ± .030 .XX = ± .015 .XXX = ± .005

Part No: WD-1002100194-WD-1002101351 — B-Size



REV	DESCRIPTION	DATE
C	MOVED BATT CHARGER NEG WIRE TO DISCONNECT SWITCH ON BATTERY SIDE	8/06/2010
B	MOVED FUSE	6/29/2010
A	INITIAL RELEASE	6/29/2010

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8FT MINI LOWER CONTROL WIRING - CE

DO NOT SCALE | HY-BRID LIFTS

Welding Tolerances: .X = ± .060 .XX = ± .030 .XXX = ± .010

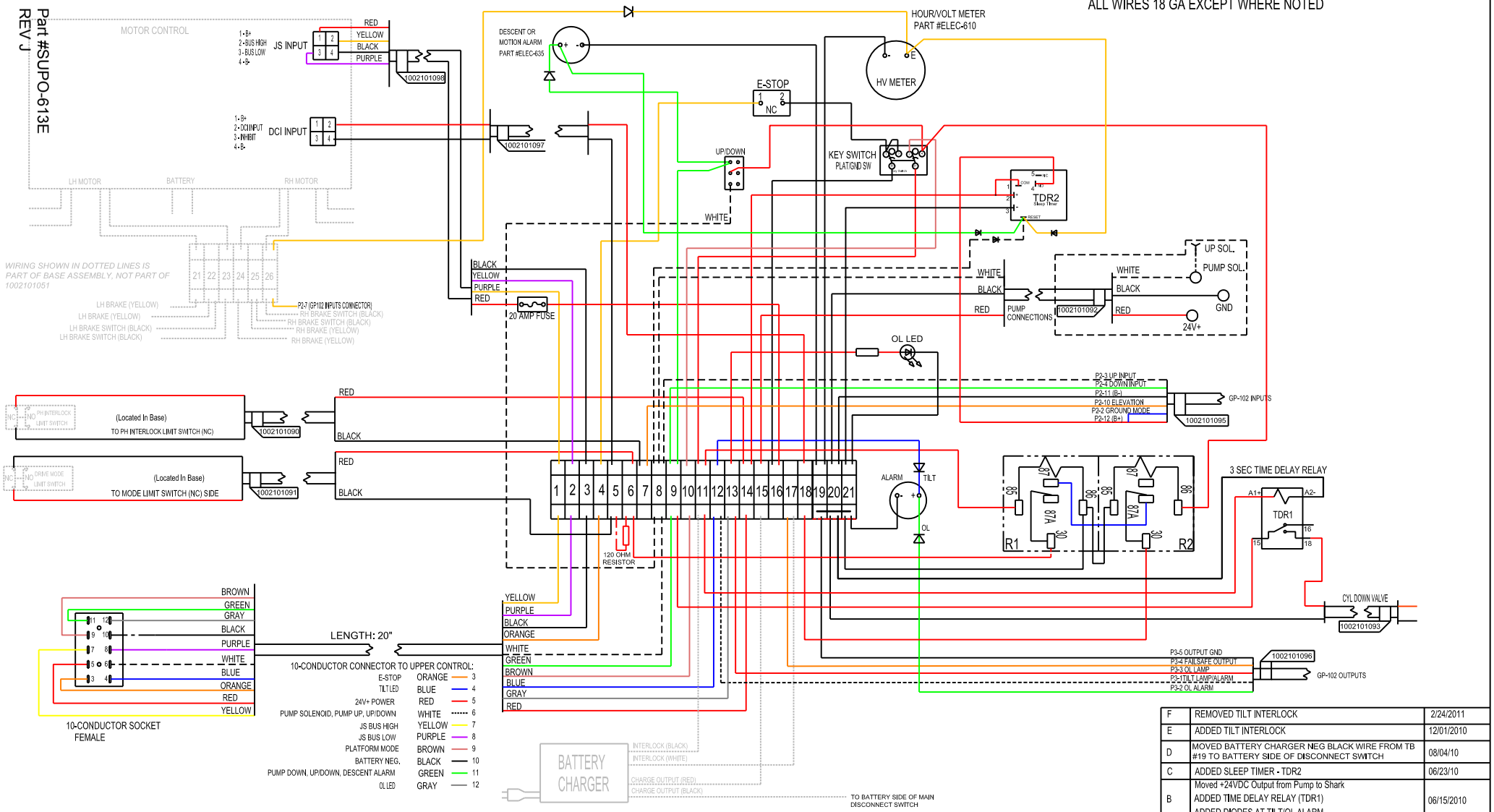
Machining Tolerances: .X = ± .030 .XX = ± .015 .XXX = ± .005

Part No: WD-1002100194-WD-1002100194 — B-Size

Part #SUPO-613E
REV J
SUB A13

Part #SUPO-613E
REV J

ALL WIRES 18 GA EXCEPT WHERE NOTED



REV	DESCRIPTION	DATE
F	REMOVED TILT INTERLOCK	2/24/2011
E	ADDED TILT INTERLOCK	12/01/2010
D	MOVED BATTERY CHARGER NEG BLACK WIRE FROM TB #19 TO BATTERY SIDE OF DISCONNECT SWITCH	08/04/10
C	ADDED SLEEP TIMER - TDR2	06/23/10
B	Moved +24VDC Output from Pump to Shark ADDED TIME DELAY RELAY (TDR1) ADDED DIODES AT TILT/OL ALARM	06/15/2010

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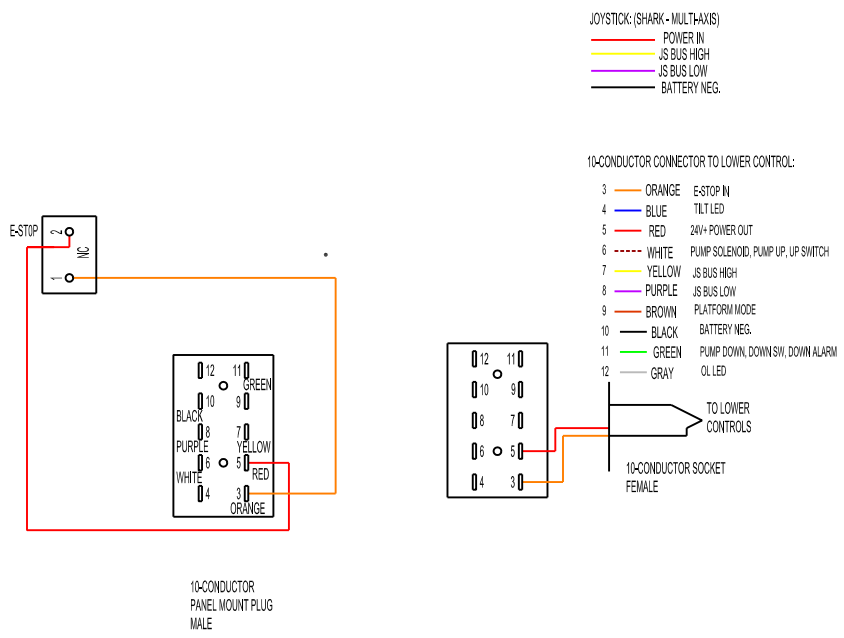
8FT MINI LOWER CONTROL WIRING - CE

DO NOT SCALE	HY-BRID LIFTS	
Welding Tolerances: .X = ± .060 .XX = ± .030 .XXX = ± .010		B-Size
Machining Tolerances: .X = ± .030 .XX = ± .015 .XXX = ± .005	Part No: WD-1002100194-1002101051	

WIRING DIAGRAM
MAIN POWER/SAFETY CIRCUIT



REV	DESCRIPTION	DATE
D	MOVE SHARK JS RED WIRE FROM LIFT ENABLE TO E-STOP CONTACT	07/22/2010
C	MOVE OL RED WIRE FROM CONN. PLUG TERM #4 TO TERM. #12 MOVE TILT LED RED WIRE FROM CONN. PLUG TERM #12 TO TERM. #4	07/19/2010
B	MOVE SHARK RED WIRE FROM E-STOP TO LIFT ENABLE	06/23/2010
A	INITIAL RELEASE	05/03/2010

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UPPER CONTROL WIRING-8FT MINI-CE

DO NOT SCALE | HY-BRID LIFTS
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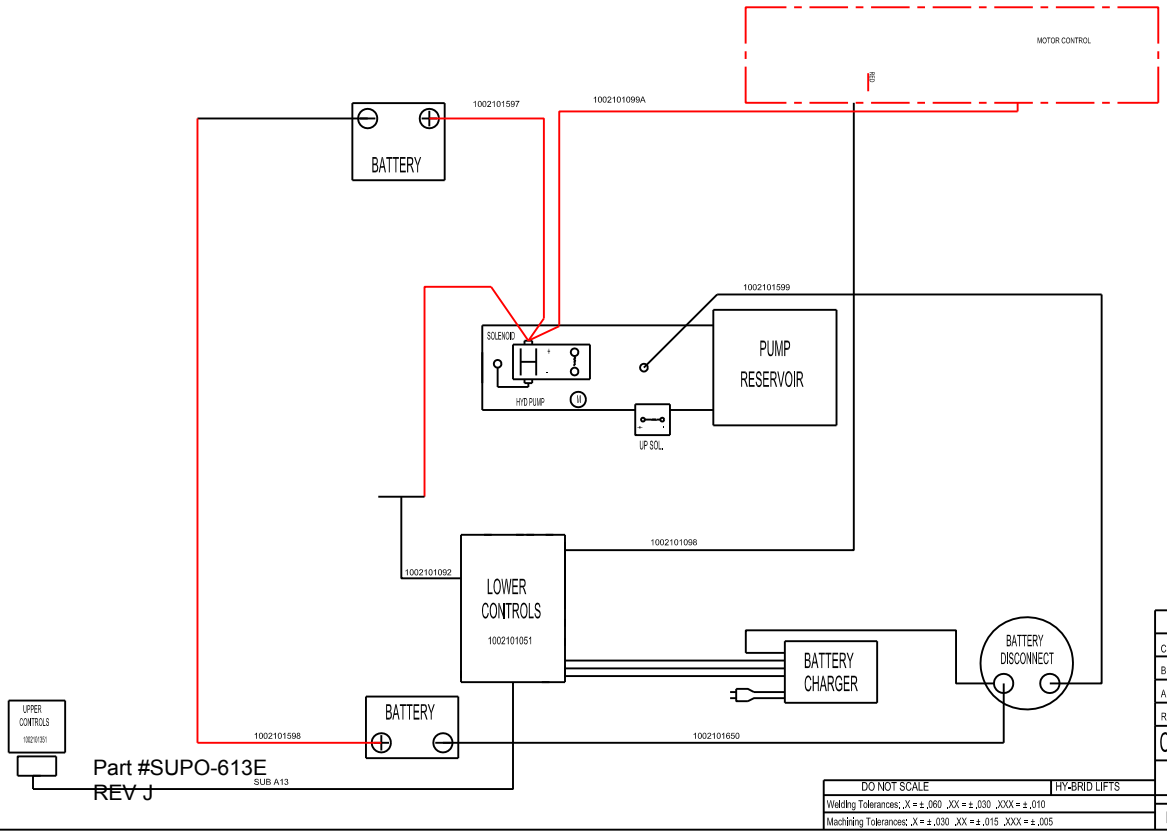
Machining Tolerances: .X = ± .030 .XX = ± .015 .XXX = ± .005

Part No: WD-1002100194-WD-1002101351 | B-Size



REV	DESCRIPTION	DATE
C	MOVED BATT CHARGER NEG WIRE TO DISCONNECT SWITCH ON BATTERY SIDE	8/06/2010
B	MOVED FUSE	6/29/2010
A	INITIAL RELEASE	6/29/2010

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8FT MINI LOWER CONTROL WIRING - CE

DO NOT SCALE | HY-BRID LIFTS
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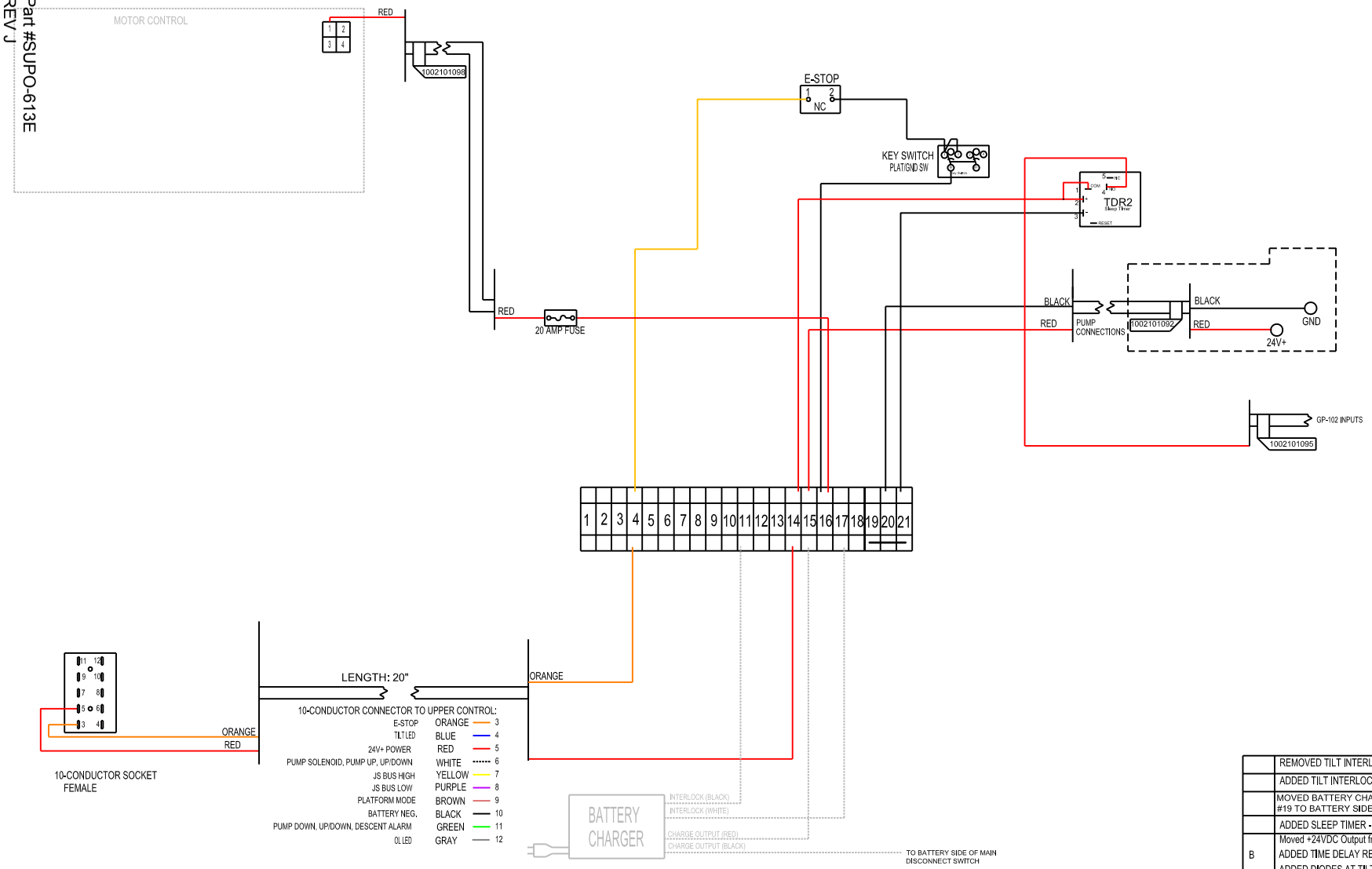
Part No: WD-1002100194-WD-1002100194 | B-Size

Part #SUPO-613E
REV J
SUB A13

Part #SUPO-613E
REV J

ALL WIRES 18 GA EXCEPT WHERE NOTED

WIRING DIAGRAM
MAIN POWER/SAFETY CIRCUIT



REV	DESCRIPTION	DATE
	REMOVED TILT INTERLOCK	2/24/2011
	ADDED TILT INTERLOCK	12/01/2010
	MOVED BATTERY CHARGER NEG BLACK WIRE FROM TB #19 TO BATTERY SIDE OF DISCONNECT SWITCH	08/04/10
	ADDED SLEEP TIMER - TDR2	06/23/10
B	Moved +24VDC Output from Pump to Shark ADDED TIME DELAY RELAY (TDR1) ADDED DIODES AT TILT/OL ALARM	06/15/2010

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8FT MINI LOWER CONTROL WIRING - CE

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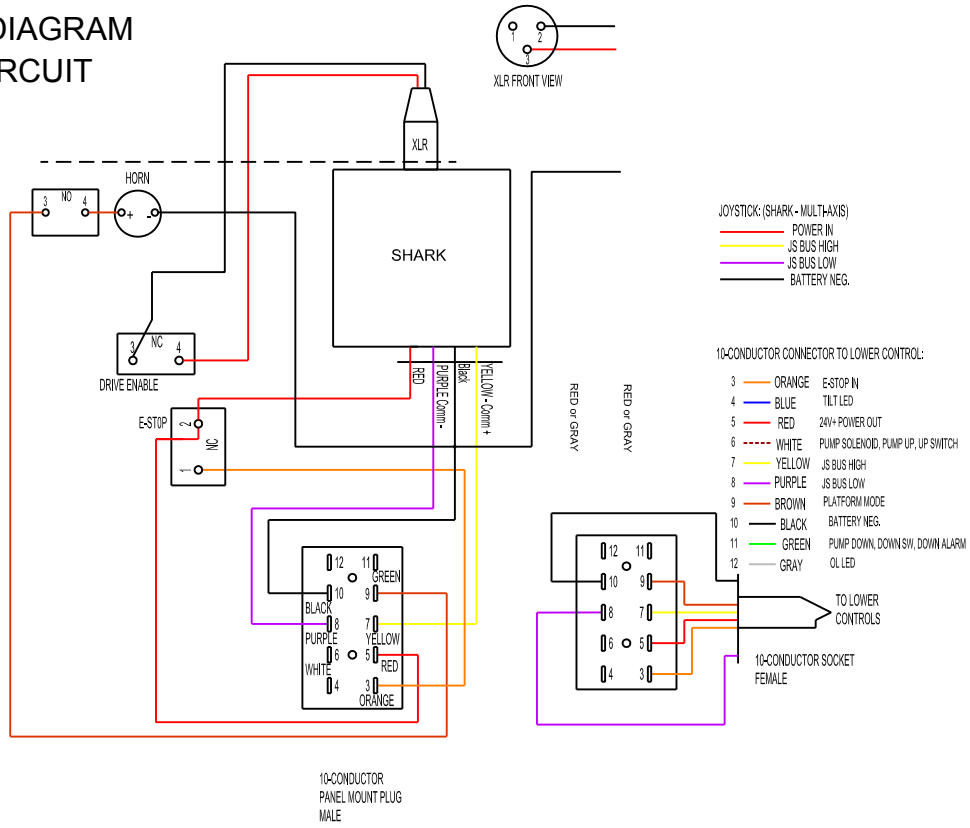
Machining Tolerances: .X = ± .030 .XX = ± .015 .XXX = ± .005	

B-Size

Part No: WD-1002100194-1002101051

WIRING DIAGRAM
DRIVE CIRCUIT



REV	DESCRIPTION	DATE
D	MOVE SHARK JS RED WIRE FROM LIFT ENABLE TO E-STOP CONTACT	07/22/2010
C	MOVE OL RED WIRE FROM CONN. PLUG TERM #4 TO TERM. #12 MOVE TILT LED RED WIRE FROM CONN. PLUG TERM #12 TO TERM. #4	07/19/2010
B	MOVE SHARK RED WIRE FROM E-STOP TO LIFT ENABLE	06/23/2010
A	INITIAL RELEASE	05/03/2010

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UPPER CONTROL WIRING-8FT MINI-CE

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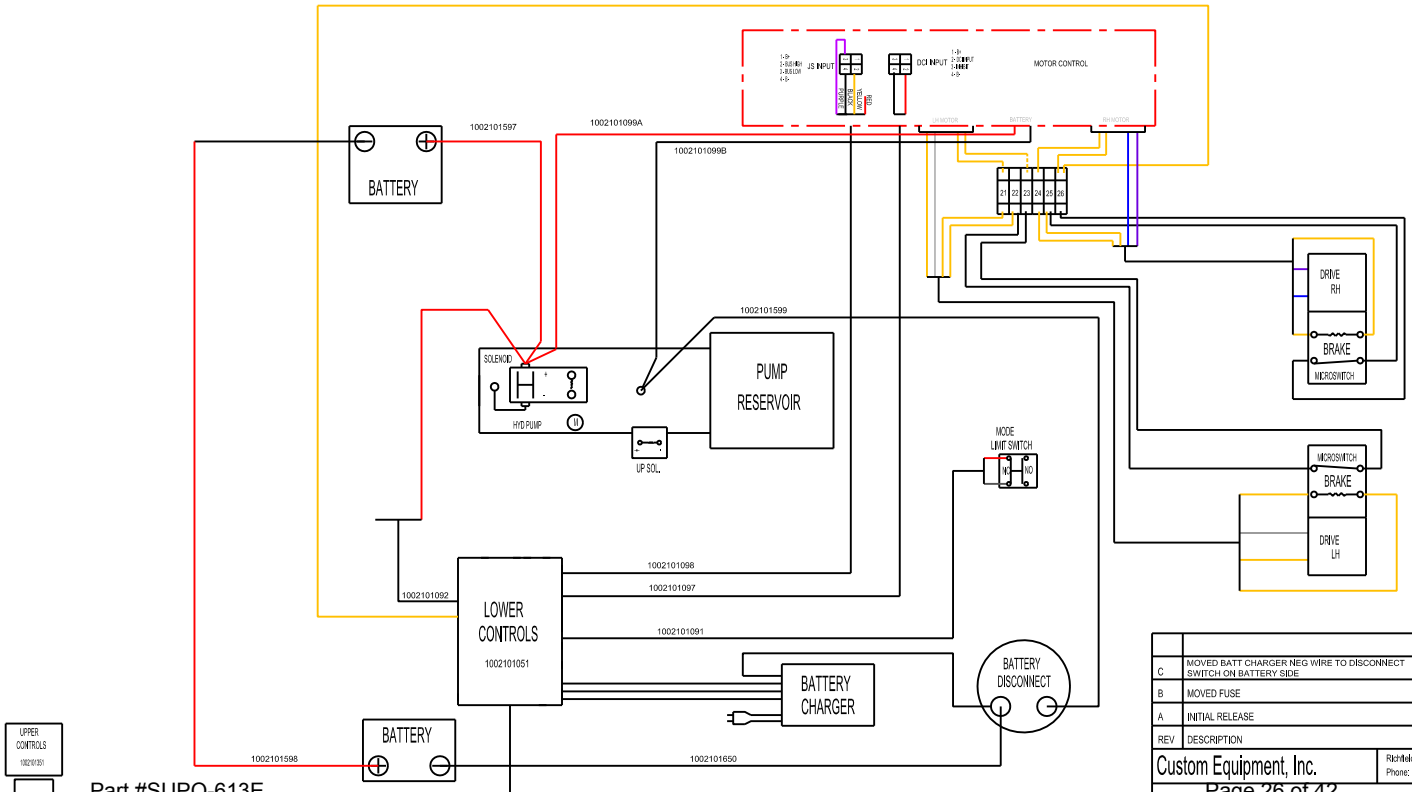
Machining Tolerances: .X = ± .030 .XX = ± .015 .XXX = ± .005

Part No: WD-1002100194-WD-1002101351 — B-Size



REV	DESCRIPTION	DATE
C	MOVED BATT CHARGER NEG WIRE TO DISCONNECT SWITCH ON BATTERY SIDE	8/06/2010
B	MOVED FUSE	6/29/2010
A	INITIAL RELEASE	6/29/2010

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8FT MINI LOWER CONTROL WIRING - CE

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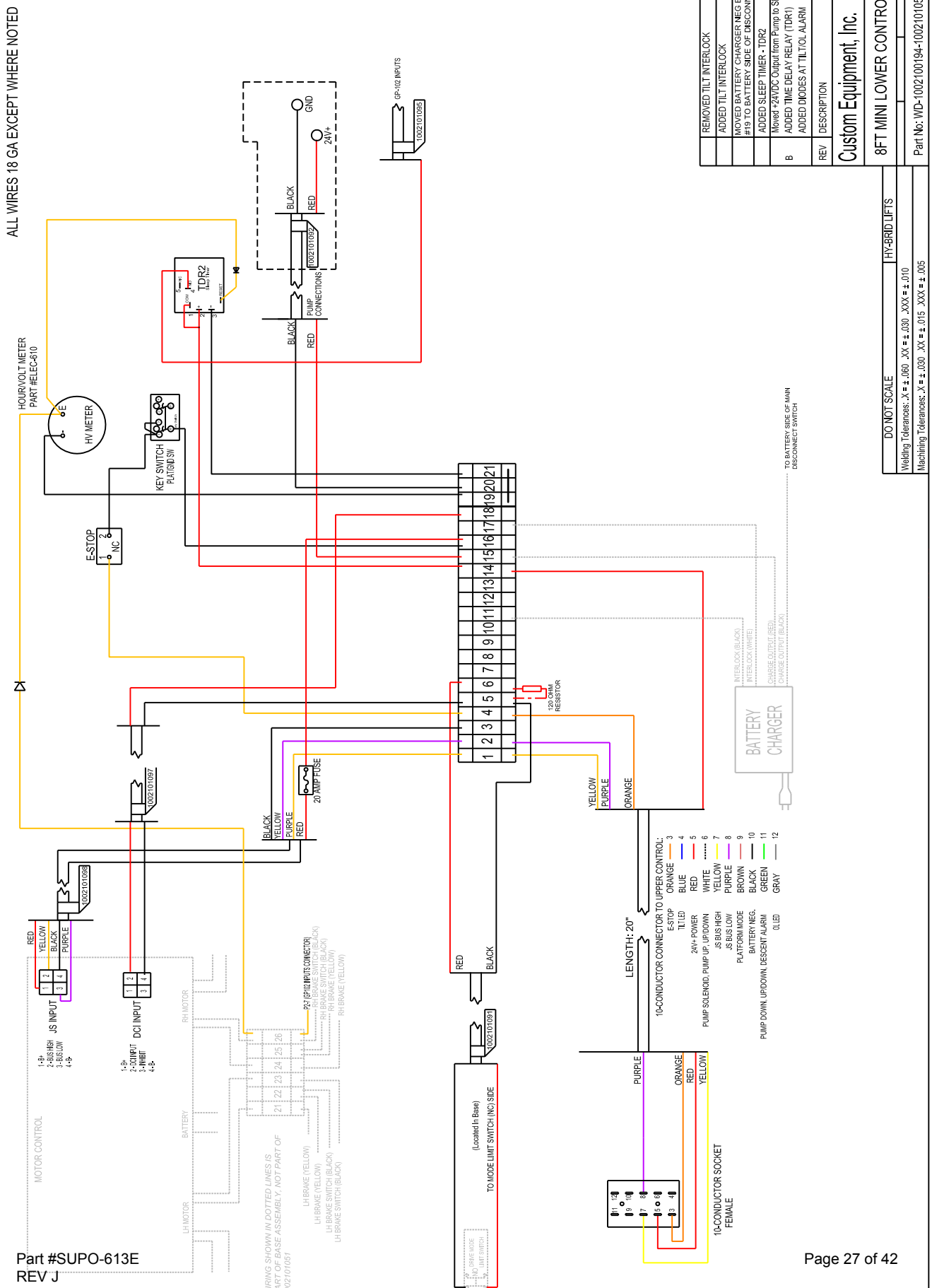
Part No: WD-1002100194-WD-1002100194 — B-Size

Part #SUPO-613E
REV J
SUB A13

WIRING DIAGRAM
DRIVE CIRCUIT



REV	DESCRIPTION	DATE
	REMOVED TILT INTERLOCK	2/24/2011
	ADDED TILT INTERLOCK	12/01/2010
	MOVED BATTERY CHARGER NEG BLACK WIRE FROM TB #19 TO BATTERY SIDE OF DISCONNECT SWITCH	08/04/10
	ADDED SLEEP TIMER - TDR2	06/23/10
B	Moved +24VDC Output from Pump to Shark ADDED TIME DELAY RELAY (TDR1) ADDED DIODES AT TILT/OL ALARM	06/15/2010

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8FT MINI LOWER CONTROL WIRING - CE

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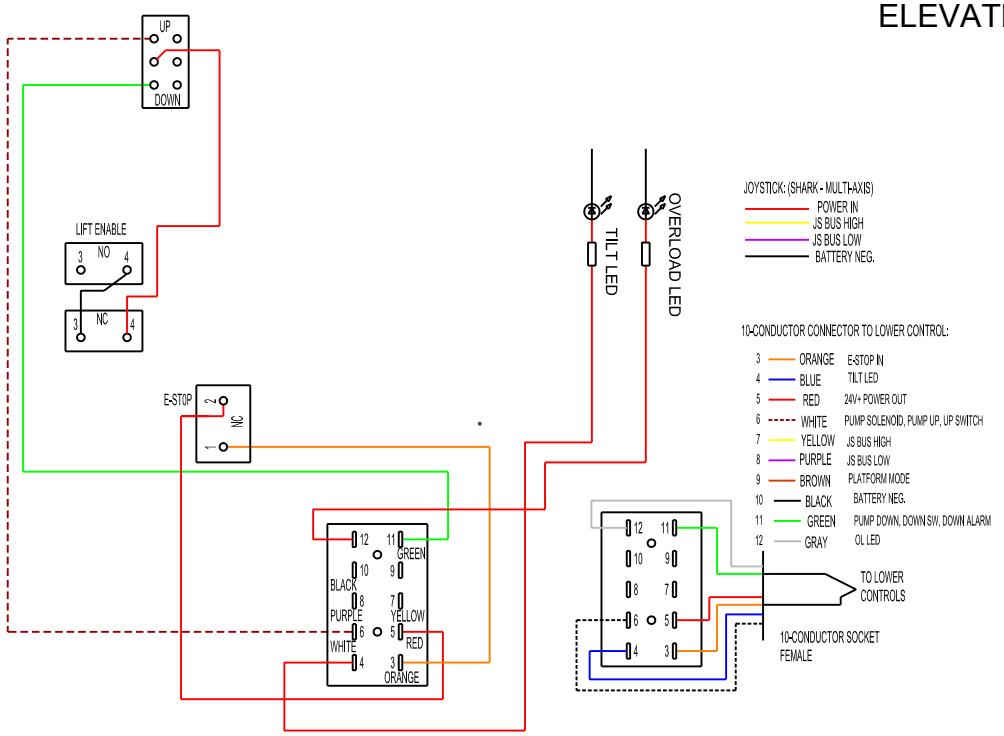
Part No: WD-1002100194-1002101051

Part #SUPO-613E
REV J

WIRING DIAGRAM
ELEVATE/LOWER CIRCUIT



REV	DESCRIPTION	DATE
D	MOVE SHARK JS RED WIRE FROM LIFT ENABLE TO E-STOP CONTACT	07/22/2010
C	MOVE OL RED WIRE FROM CONN. PLUG TERM #4 TO TERM. #12 MOVE TILT LED RED WIRE FROM CONN. PLUG TERM #12 TO TERM. #4	07/19/2010
B	MOVE SHARK RED WIRE FROM E-STOP TO LIFT ENABLE	06/23/2010
A	INITIAL RELEASE	05/03/2010

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UPPER CONTROL WIRING-8FT MINI-CE

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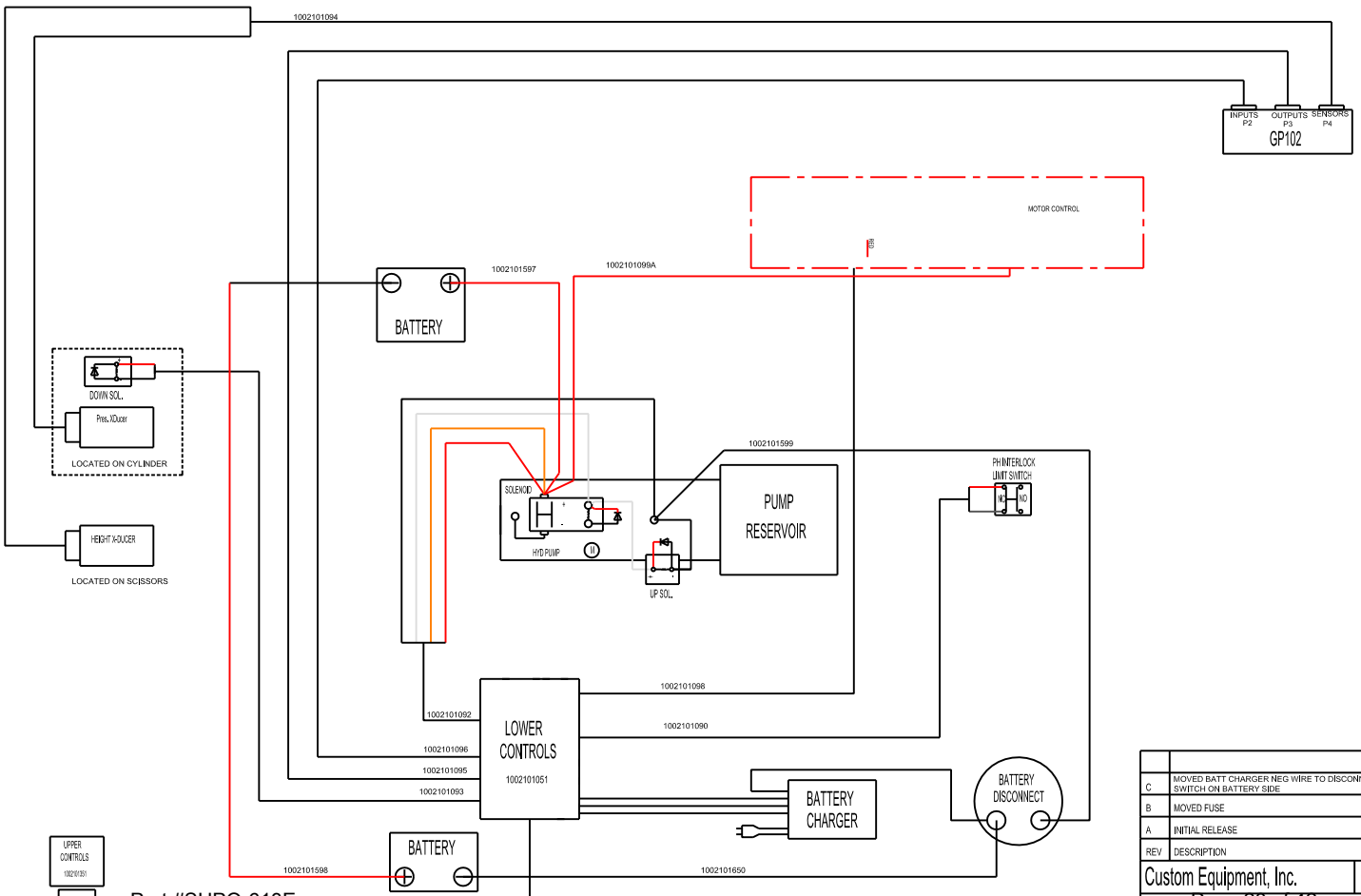
Part No: WD-1002100194-WD-1002101351 — B-Size



REV	DESCRIPTION	DATE
C	MOVED BATT CHARGER NEG WIRE TO DISCONNECT SWITCH ON BATTERY SIDE	8/06/2010
B	MOVED FUSE	6/29/2010
A	INITIAL RELEASE	6/29/2010

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8FT MINI LOWER CONTROL WIRING - CE

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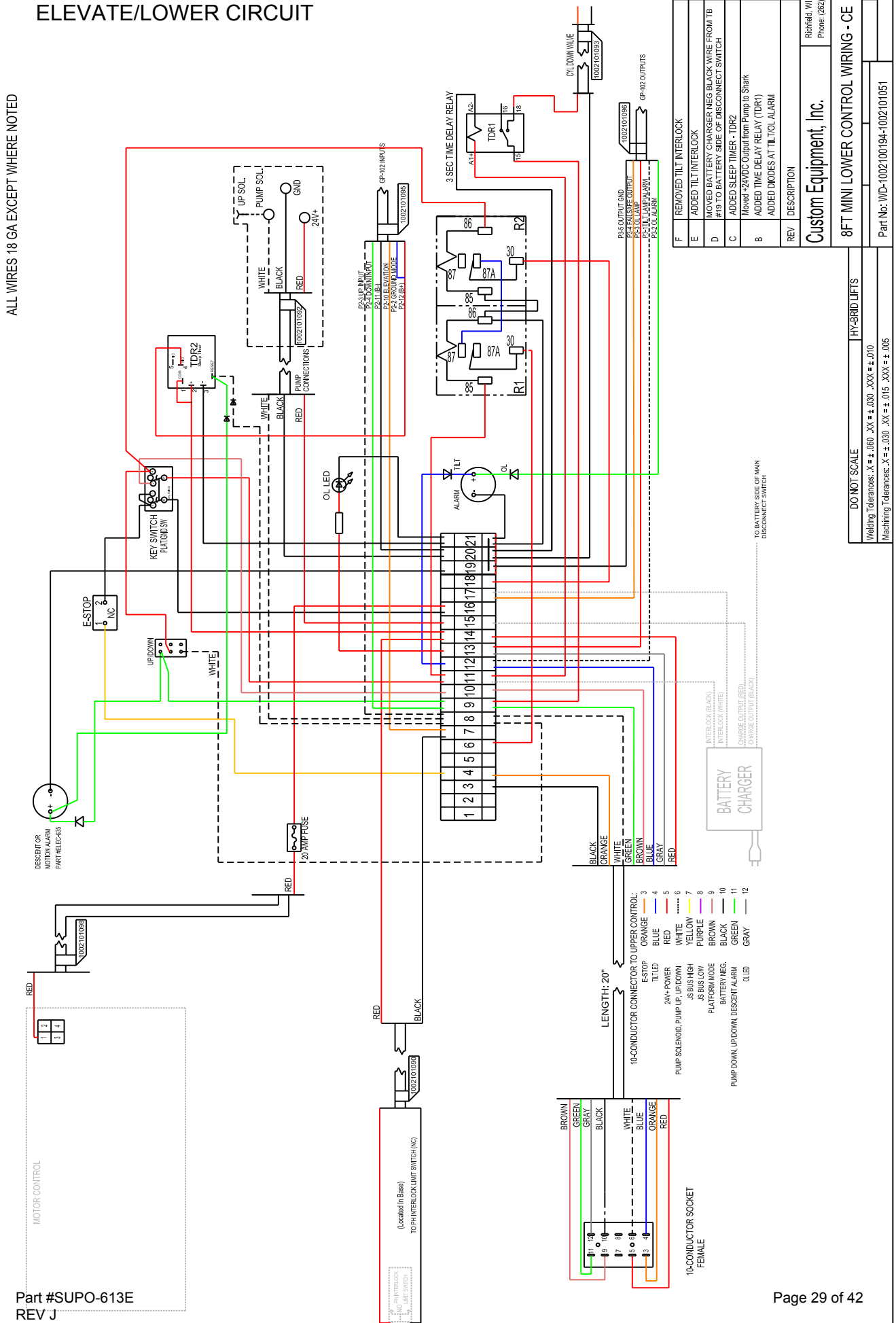
Part No: WD-1002100194-WD-1002100194 — B-Size

Part #SUPO-613E
REV J
SUB A13

WIRING DIAGRAM
ELEVATE/LOWER CIRCUIT



REV	DESCRIPTION	DATE
F	REMOVED TILT INTERLOCK	2/24/2011
E	ADDED TILT INTERLOCK	12/01/2010
D	MOVED BATTERY CHARGER NEG BLACK WIRE FROM TB #19 TO BATTERY SIDE OF DISCONNECT SWITCH	08/04/10
C	ADDED SLEEP TIMER - TDR2	06/23/10
B	Moved +24VDC Output from Pump to Shark ADDED TIME DELAY RELAY (TDR1) ADDED DIODES AT TILT/OL ALARM	06/15/2010

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8FT MINI LOWER CONTROL WIRING - CE

B-Size

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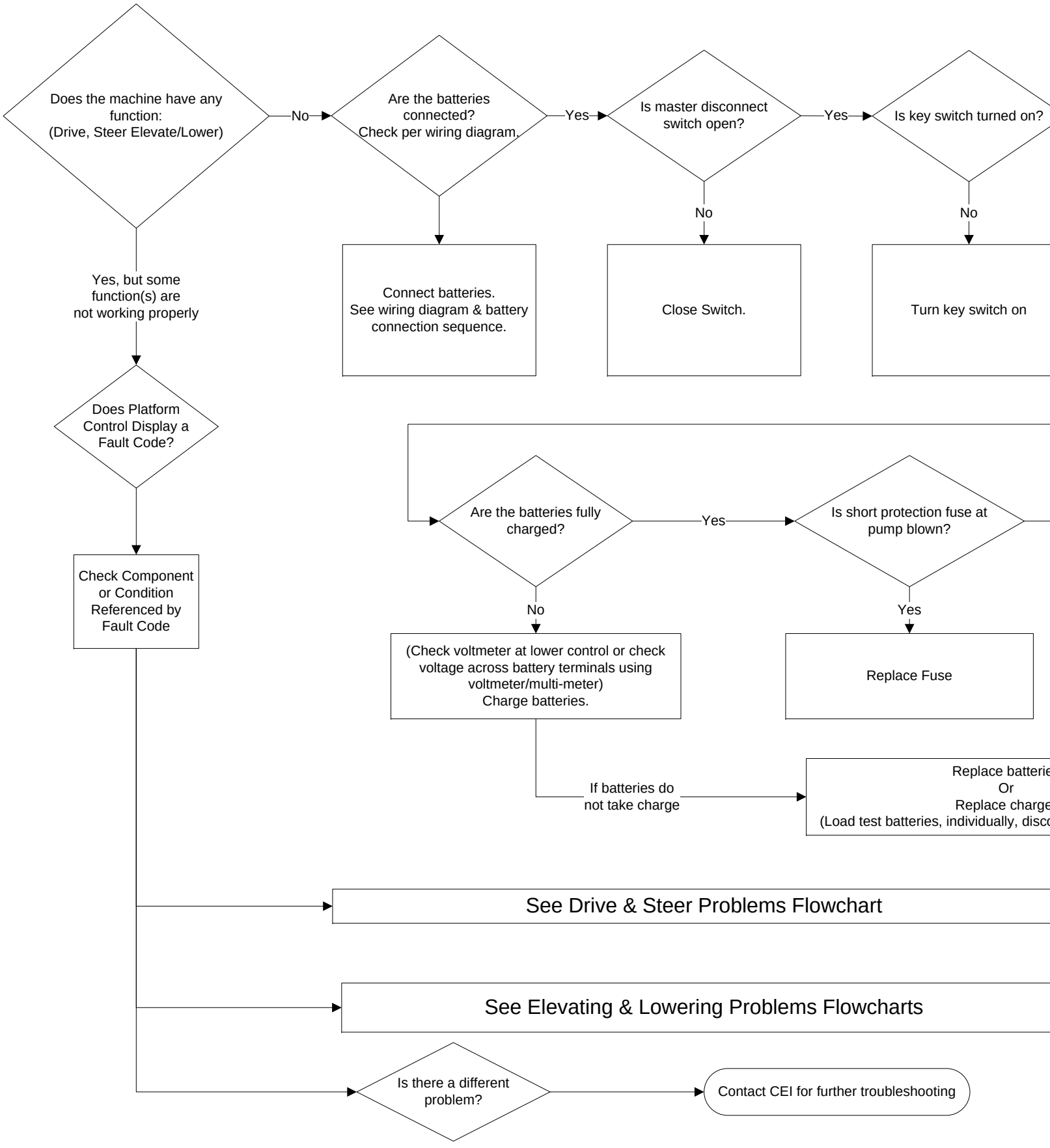
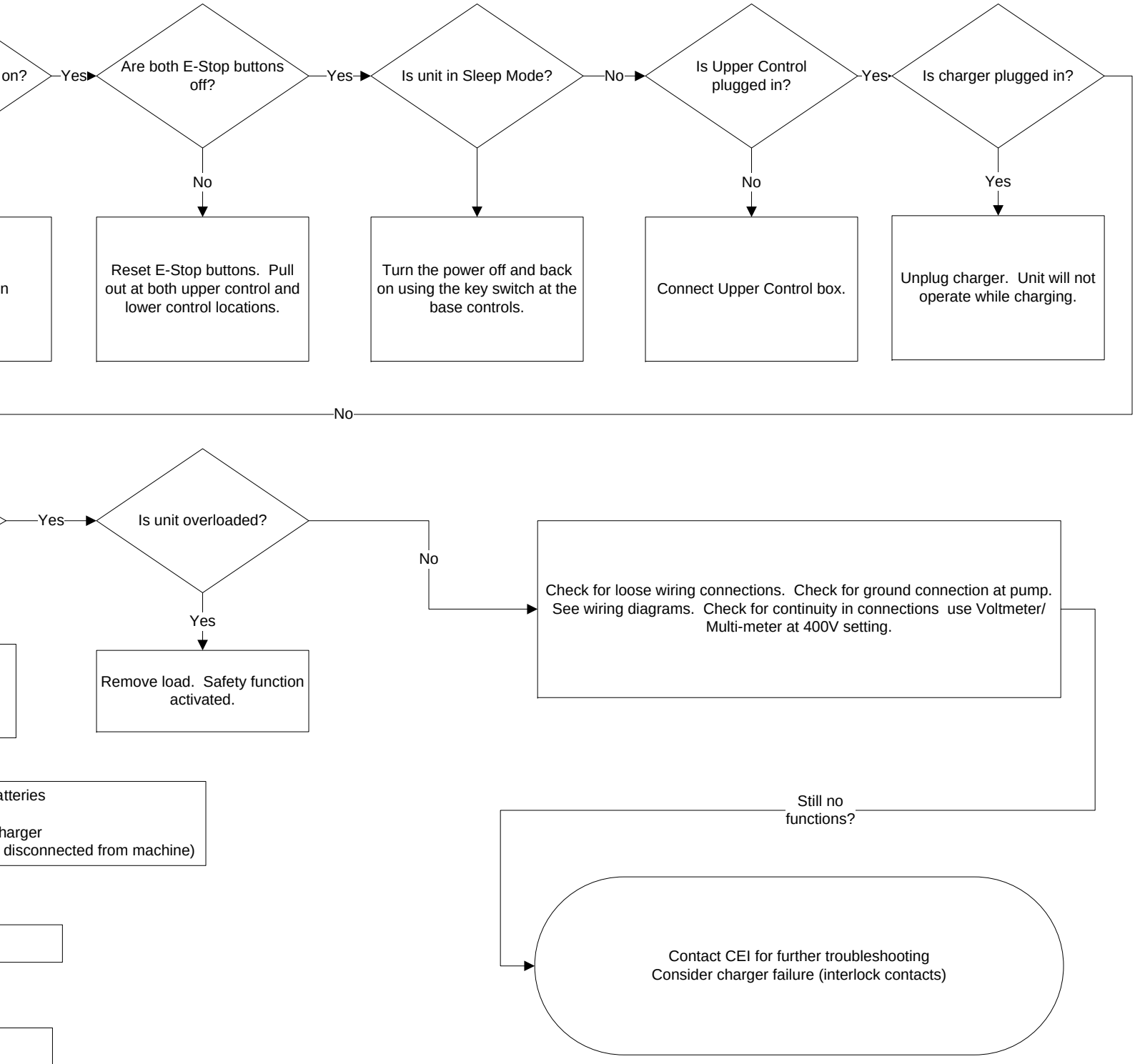
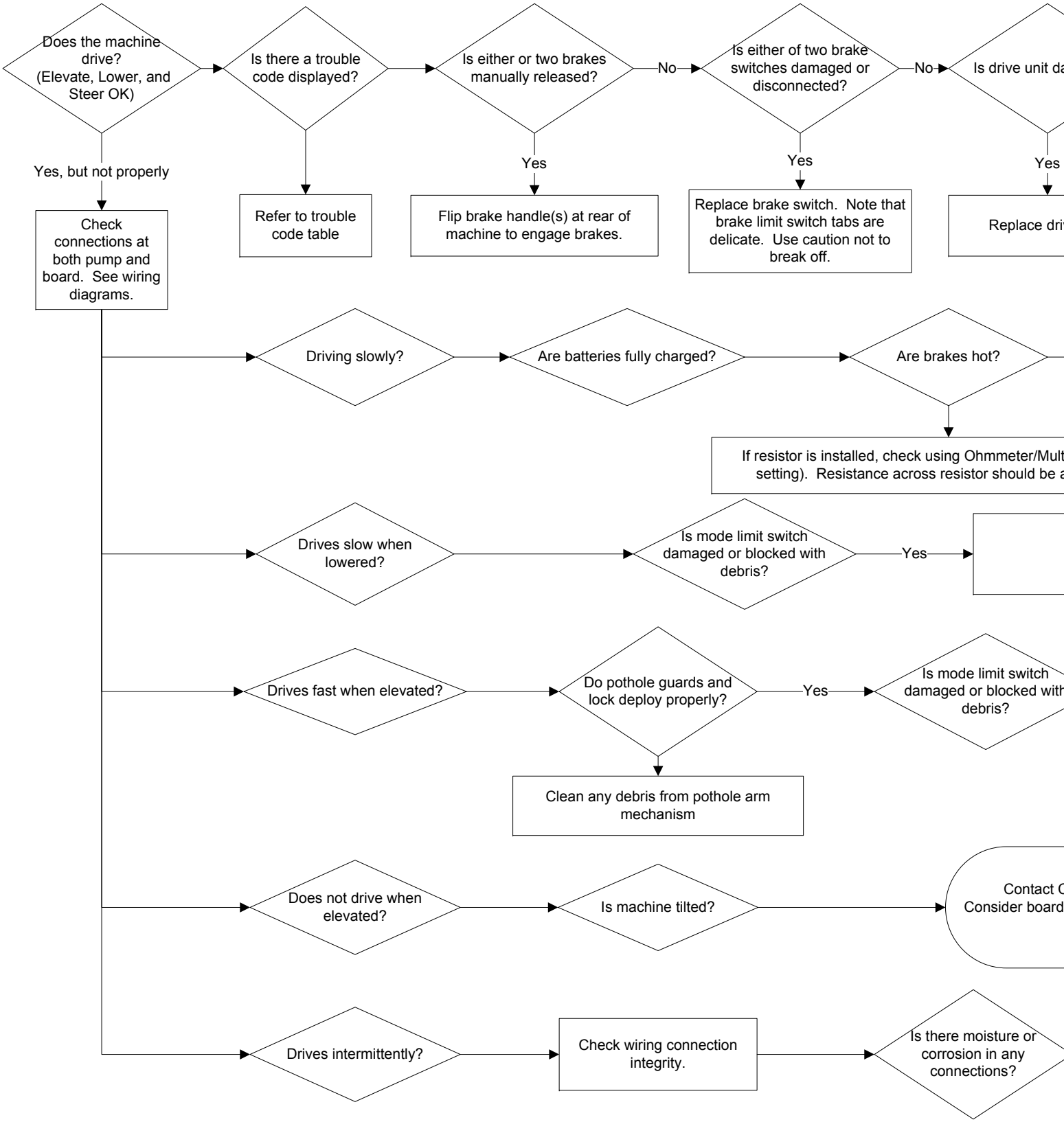
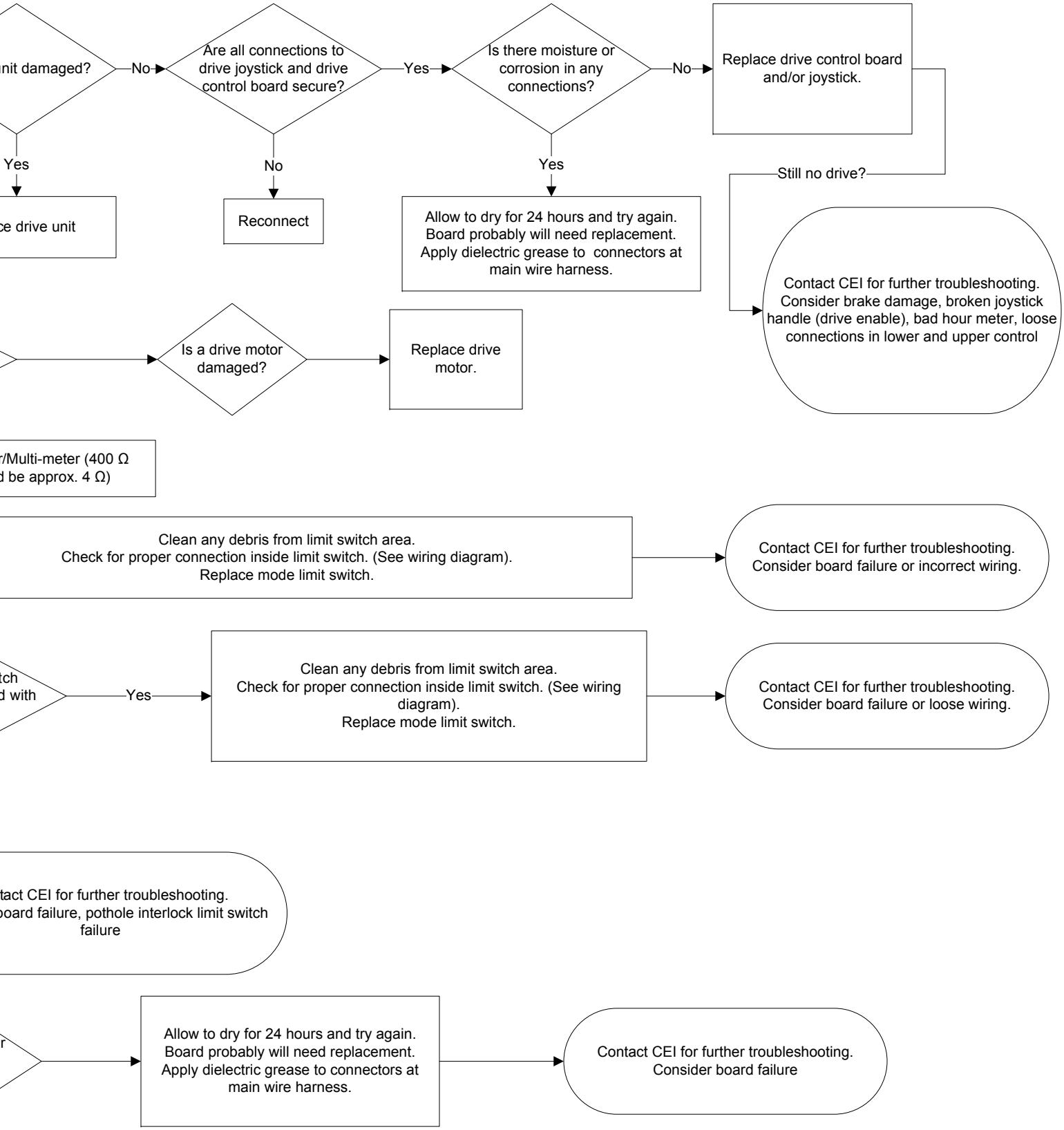
Part No: WD-1002100194-1002101051


Does the machine have any function:
(Drive, Steer Elevate/Lower)
No
Are the batteries connected?
Check per wiring diagram.
Yes
Is master disconnect switch open?
Yes
Is key switch turned on?
No
No
Connect batteries.
See wiring diagram & battery connection sequence.
Close Switch.
Turn key switch on
Yes, but some function(s) are not working properly
Does Platform Control Display a Fault Code?
Check Component or Condition Referenced by Fault Code
Are the batteries fully charged?
Yes
Is short protection fuse at pump blown?
No
Yes
(Check voltmeter at lower control or check voltage across battery terminals using voltmeter/multi-meter)
Charge batteries.
Replace Fuse
If batteries do not take charge
Replace batterie
Or
Replace charge
(Load test batteries, individually, disco
See Drive & Steer Problems Flowchart
See Elevating & Lowering Problems Flowcharts
Is there a different problem?
Contact CEI for further troubleshooting

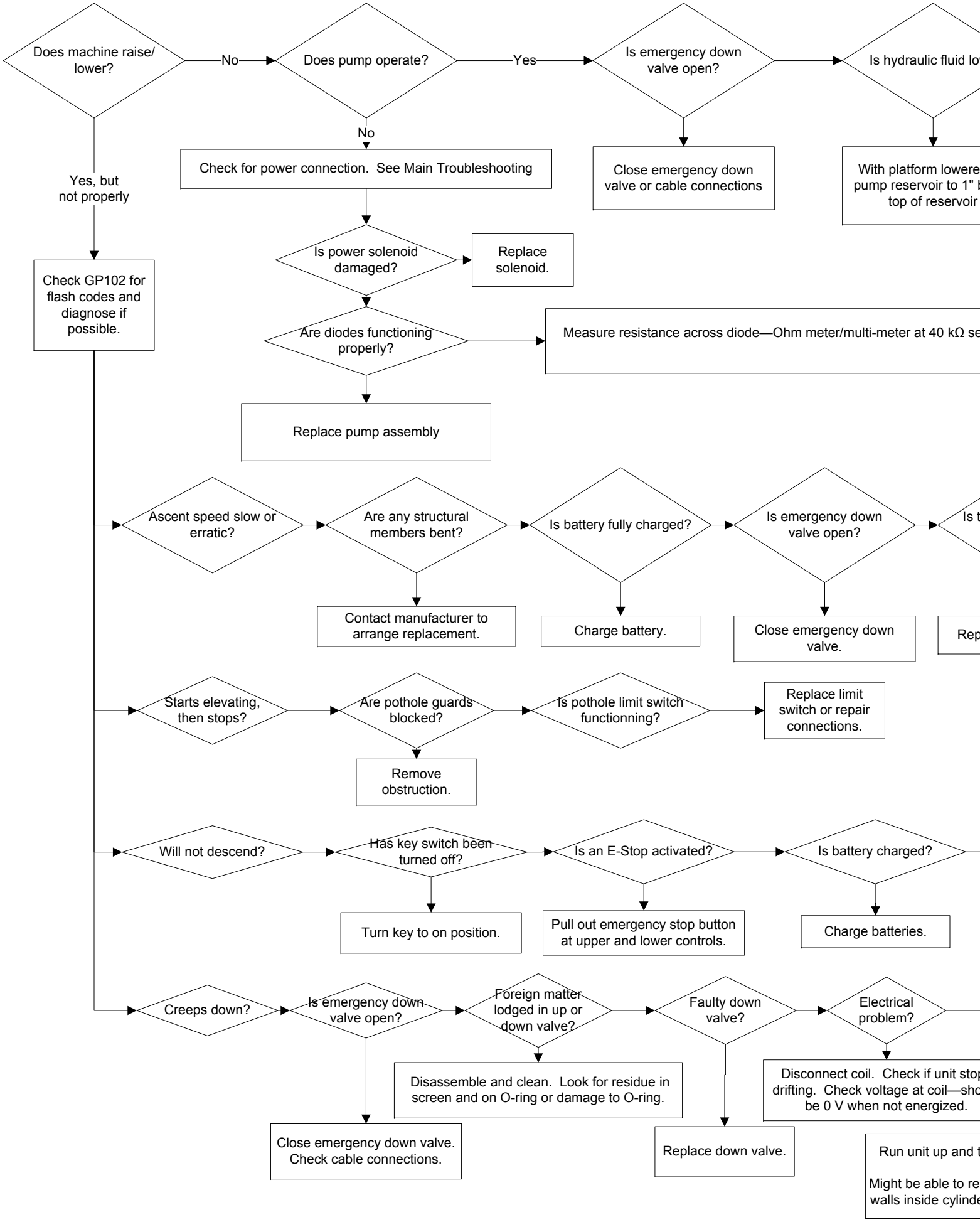

on?
Yes
Are both E-Stop buttons off?
Yes
Is unit in Sleep Mode?
No
Is Upper Control plugged in?
Yes
Is charger plugged in?
No
No
Yes
n
Reset E-Stop buttons. Pull out at both upper control and lower control locations.
Turn the power off and back on using the key switch at the base controls.
Connect Upper Control box.
Unplug charger. Unit will not operate while charging.
No
Yes
Is unit overloaded?
No
Yes
Remove load. Safety function activated.
Check for loose wiring connections. Check for ground connection at pump. See wiring diagrams. Check for continuity in connections use Voltmeter/ Multi-meter at 400V setting.
atteries
harger
disconnected from machine)
Still no functions?
Contact CEI for further troubleshooting
Consider charger failure (interlock contacts)

SUPO-613E HB-830CE Troubleshooting Flowchart	
Revision A: Initial Release	06/01/2010
Revision B: Added Sleep Timer	06/29/2010


Does the machine drive? (Elevate, Lower, and Steer OK)
Is there a trouble code displayed?
Is either or two brakes manually released?
No
Is either of two brake switches damaged or disconnected?
No
Is drive unit da
Yes, but not properly
Yes
Yes
Yes
Check connections at both pump and board. See wiring diagrams.
Refer to trouble code table
Flip brake handle(s) at rear of machine to engage brakes.
Replace brake switch. Note that brake limit switch tabs are delicate. Use caution not to break off.
Replace dri
Driving slowly?
Are batteries fully charged?
Are brakes hot?
If resistor is installed, check using Ohmmeter/Mult
setting). Resistance across resistor should be a
Drives slow when lowered?
Is mode limit switch damaged or blocked with debris?
Yes
Drives fast when elevated?
Do pothole guards and lock deploy properly?
Yes
Is mode limit switch damaged or blocked with debris?
Clean any debris from pothole arm mechanism
Does not drive when elevated?
Is machine tilted?
Contact C
Consider board
Drives intermittently?
Check wiring connection integrity.
Is there moisture or corrosion in any connections?


nit damaged?
No
Are all connections to drive joystick and drive control board secure?
Yes
Is there moisture or corrosion in any connections?
No
Replace drive control board and/or joystick.
Yes
No
Yes
Still no drive?
ce drive unit
Reconnect
Allow to dry for 24 hours and try again. Board probably will need replacement. Apply dielectric grease to connectors at main wire harness.
Contact CEI for further troubleshooting. Consider brake damage, broken joystick handle (drive enable), bad hour meter, loose connections in lower and upper control
Is a drive motor damaged?
Replace drive motor.
r/Multi-meter (400 Ω
d be approx. 4 Ω)
Clean any debris from limit switch area.
Check for proper connection inside limit switch. (See wiring diagram).
Replace mode limit switch.
Contact CEI for further troubleshooting.
Consider board failure or incorrect wiring.
tch
d with
Yes
Clean any debris from limit switch area.
Check for proper connection inside limit switch. (See wiring diagram).
Replace mode limit switch.
Contact CEI for further troubleshooting.
Consider board failure or loose wiring.
tact CEI for further troubleshooting.
oard failure, pothole interlock limit switch failure
r
Allow to dry for 24 hours and try again. Board probably will need replacement. Apply dielectric grease to connectors at main wire harness.
Contact CEI for further troubleshooting.
Consider board failure

SUPO-613E HB-S830CE Troubleshooting Flowchart
Drive Problems
Revision A: Initial Release 06/01/2010


Does machine raise/ lower?
No
Does pump operate?
Yes
Is emergency down valve open?
Is hydraulic fluid lo
No
Check for power connection. See Main Troubleshooting
Close emergency down valve or cable connections
With platform lowere pump reservoir to 1" b top of reservoir
Yes, but not properly
Is power solenoid damaged?
Replace solenoid.
Check GP102 for flash codes and diagnose if possible.
Are diodes functioning properly?
Measure resistance across diode—Ohm meter/multi-meter at 40 kΩ se
Replace pump assembly
Ascent speed slow or erratic?
Are any structural members bent?
Is battery fully charged?
Is emergency down valve open?
Is t
Contact manufacturer to arrange replacement.
Charge battery.
Close emergency down valve.
Rep
Starts elevating, then stops?
Are pothole guards blocked?
Is pothole limit switch functionning?
Replace limit switch or repair connections.
Remove obstruction.
Will not descend?
Has key switch been turned off?
Is an E-Stop activated?
Is battery charged?
Turn key to on position.
Pull out emergency stop button at upper and lower controls.
Charge batteries.
Creeps down?
Is emergency down valve open?
Foreign matter lodged in up or down valve?
Faulty down valve?
Electrical problem?
Disassemble and clean. Look for residue in screen and on O-ring or damage to O-ring.
Disconnect coil. Check if unit stop drifting. Check voltage at coil—sho be 0 V when not energized.
Close emergency down valve. Check cable connections.
Replace down valve.
Run unit up and t
Might be able to re walls inside cylinde

uid low?

Is down valve stuck open?

Is up/down switch damaged?

Contact CEI for further troubleshooting.

owered, fill o 1" below ervoir

Flush valve by simultaneously pressing up switch at base and down switch on platform control for 30 sec.

Replace rocker switch at upper or lower control.

kΩ setting. With black lad on stripe side and red on other side, should get a resistance reading. Switch leads, no reading. Replace bad diode.

Is there a restriction in hydraulic hose?

Flush down valve by simultaneously pressing up switch at base and down switch on platform control for 30 sec. There may be foreign matter lodged.

Check integrity of electrical connections, There may be a loose connection or momentary short.

Replace pump. May be worn or defective.

Replace hydraulic hose.

Replace down coil.

Check for loose electrical connections.

Damaged cylinder or damaged seal in cylinder?

Coil mounting nut too tight?

Faulty check valve in pump?

it stops —should ed.

Nut should only be lightly snug: 30 in.-lb. Replace coil and lightly tighten nut.

Listen carefully near motor when not energized—may be running backwards. Replace pump

and then check for oil flow out of return line. Bad cylinder seal if oil is flowing from return line. to repair with seal kit;, probably need to replace cylinder. If ylinder are scratched or pitted, cylinder needs replacement.

Replacement Parts

CAUTION

USE ONLY MANUFACTURER APPROVED REPLACEMENT PARTS. USE OF NON-OEM PARTS WILL VOID WARRANTY.

DANGER

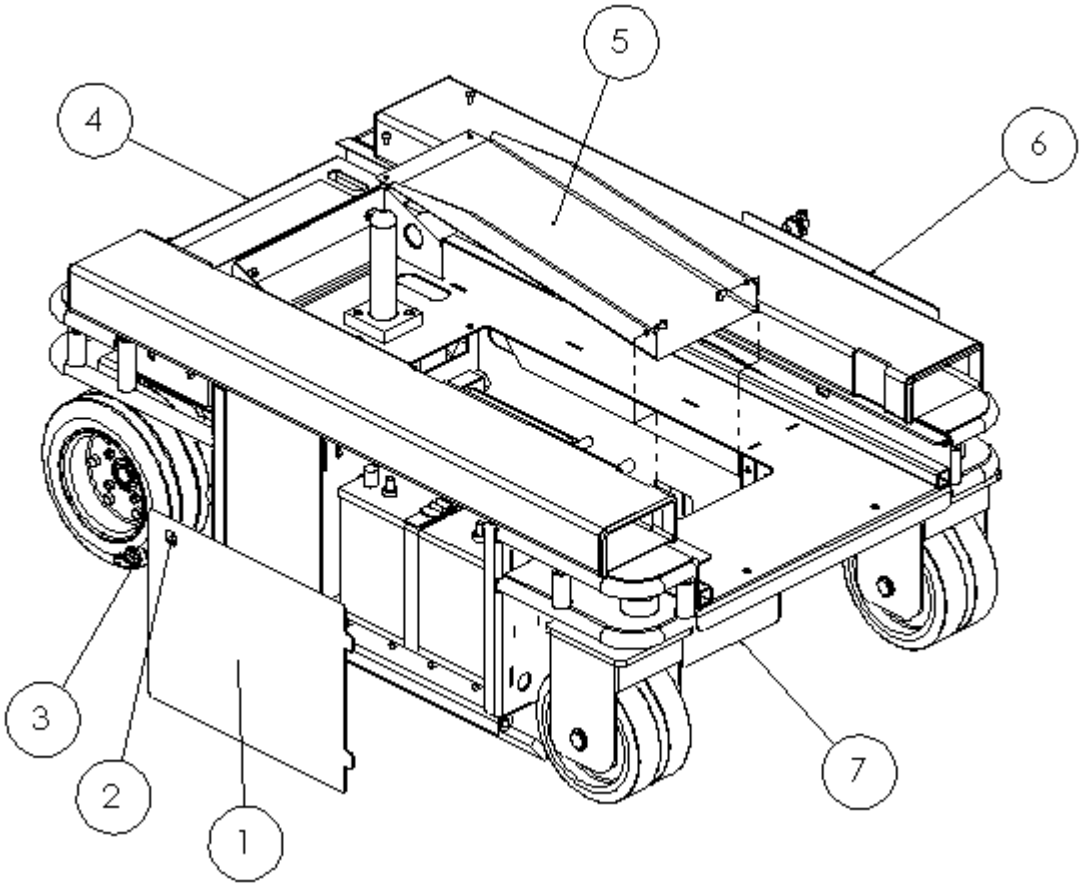
REPLACEMENT OF THE FOLLOWING COMPONENTS WILL AFFECT THE STRENGTH, STABILITY, OR SAFETY FUNCTION OF THE UNIT: BATTERY, HYDRAULIC CYLINDER, JOYSTICK AND CONTROL MODULES, AND ALL STRUCTURAL COMPONENTS.

Listed below are replacement parts that may be available and listed for reference. These represent current revisions. Refer to our website, www.hybridlifts.com for more complete part listings and earlier revisions. Several parts are model, serial number, or manufacture date specific. Contact your dealer for replacement part availability and pricing.

Safety and Control Decals

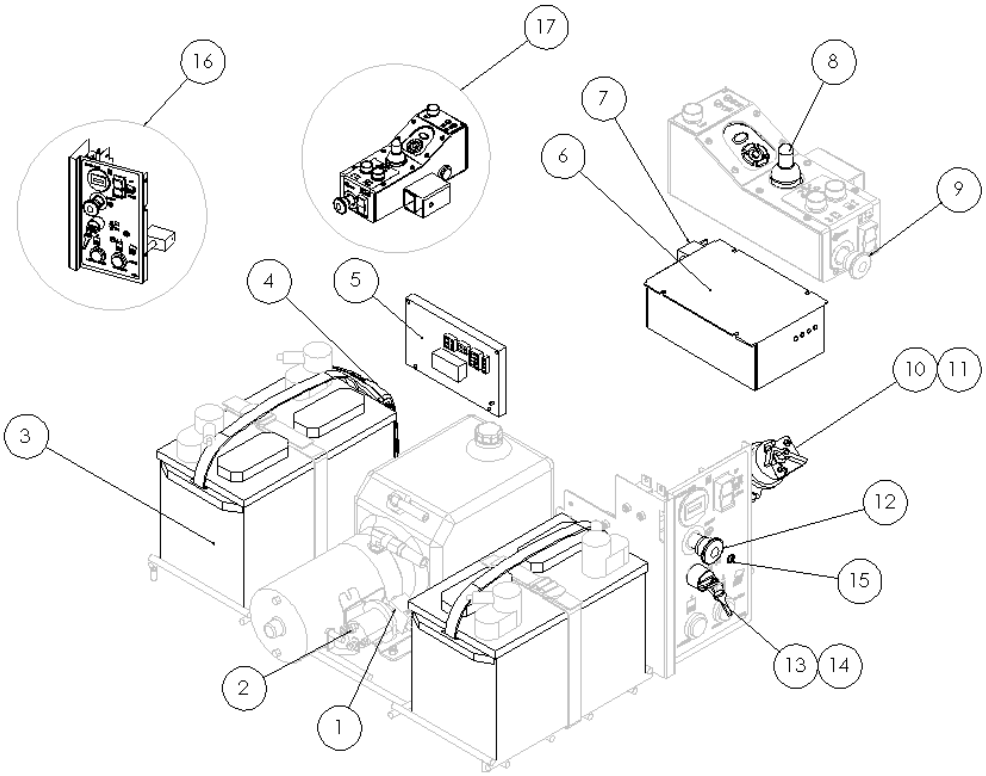
Refer to Operator's Manual for decal part numbers and locations.

Covers/Other



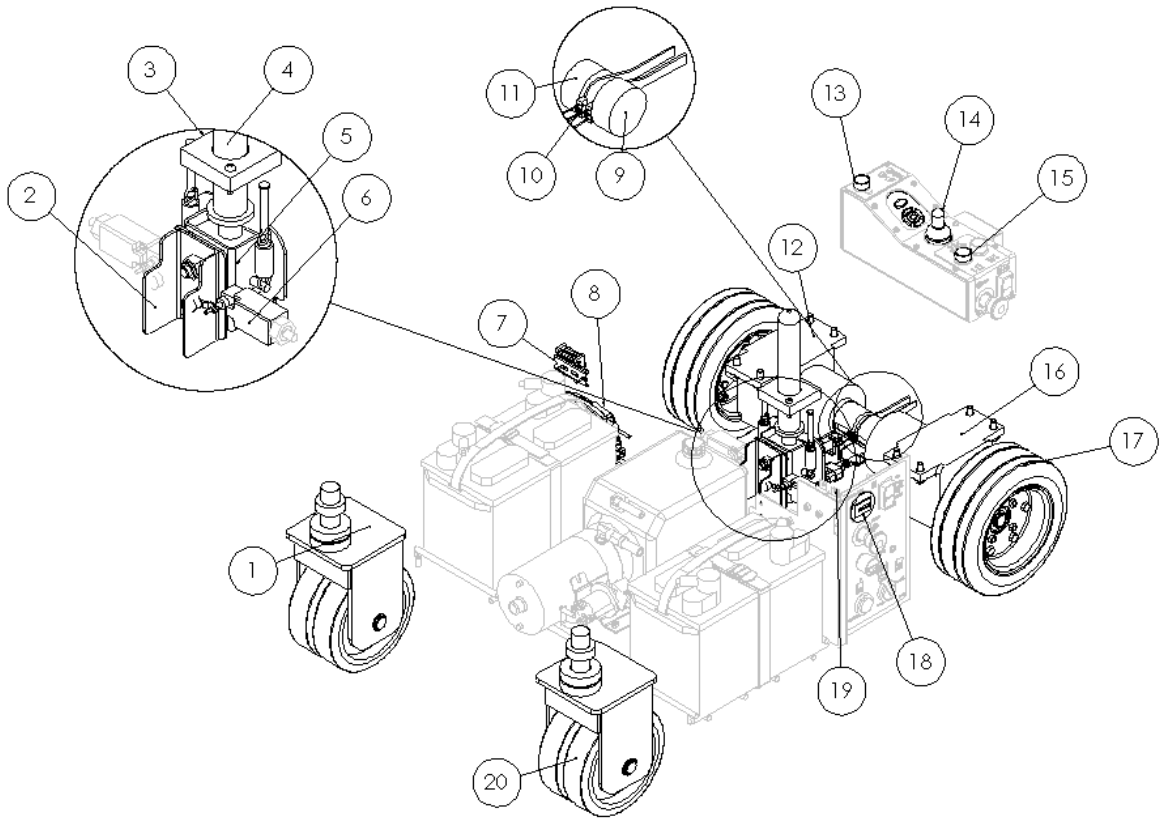
Item #	Part #	Description
1	1000500201	Cover, Side
2	HARD-633C	Cabinet Latch Cam
3	HARD-633B	Cabinet Latch Handle
4	1000103001	Step
5	1000500701	Cover, Pump Top
6	1000500201	Cover, Side
7	1000500601	Cover, Pump End

Main Power/Safety Circuit



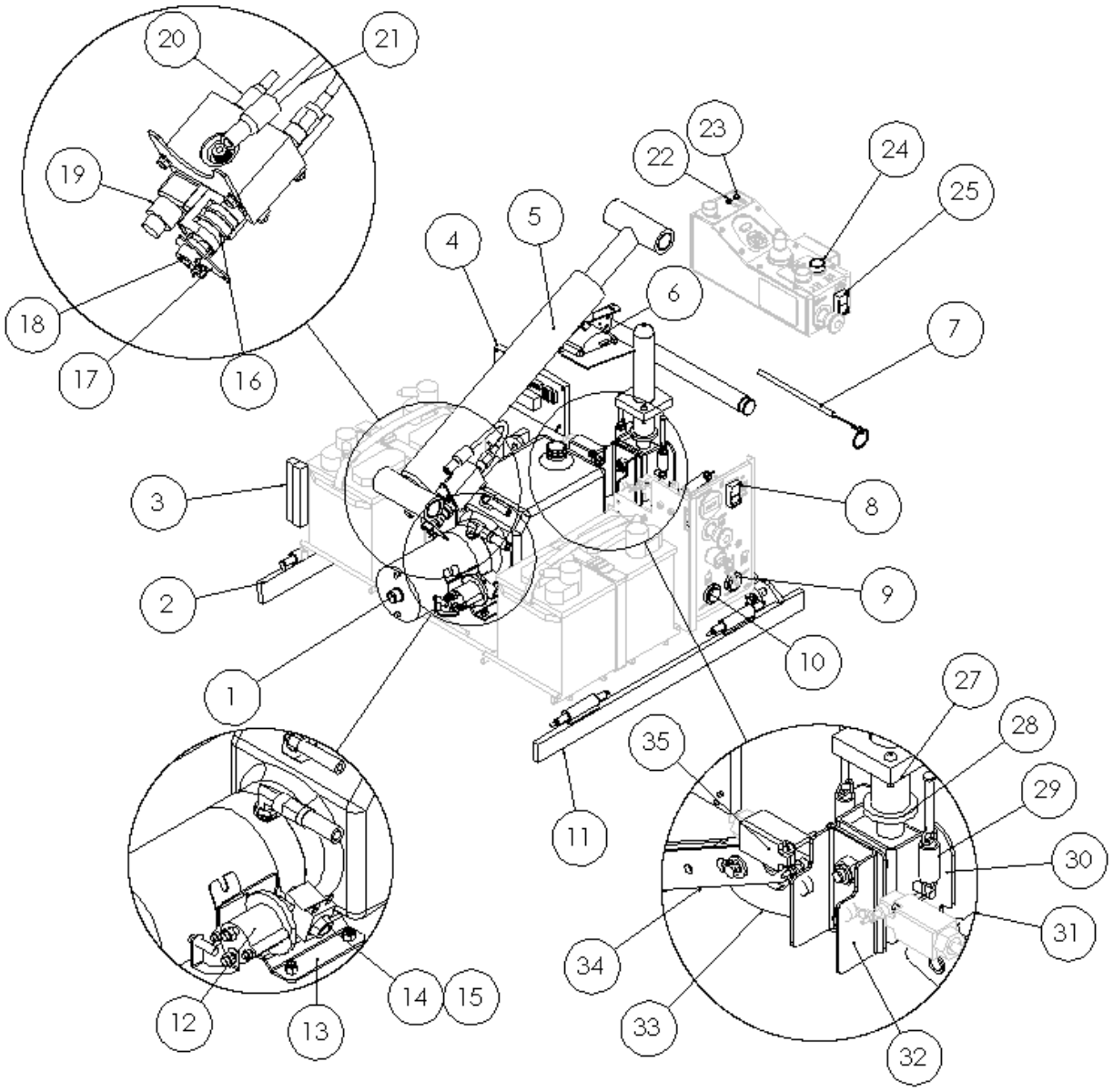
Item #	Part #	Description
1	NA	B- “Ground” Connection on Pump
2	NA	B+ Power Connection on Pump
3	(ELEC-047)	Not available as a replacement part. Replace with 12V, Group 27 Deep Cycle Marine Battery. Replacement weight must be minimum 50 lb.
4	1000106550	Drive Control Module, Program Specific to this Model/Series Only
5	1000106450	Load Control Module (GP102), Program Specific to this Model/Series Only
6	ELEC-645	Battery Charger
7	ELEC-639-1	Charger Cord (NEMA 5-15-P/IED-320 C13)
8	ELEC-551	Joystick
9	ELEC-071-KIT	Emergency Stop Button with Contact Block
10	ELEC-633-1	Master Power Switch Lever
11	ELEC-633	Master Power Switch
12	ELEC-071-KIT	Emergency Stop Button with Contact Block
13	ELEC-073E	Key Switch
14	ELEC-073E-1	Spare Key
15	ELEC-819	Sleep Timer Relay
16	1002101051	Lower Control Assembly
17	1002101351	Upper Control Assembly
Not Pictured	SUB A13	Main Cable
Not Pictured	ELEC-670-2	20 A AGC Fuse
Not Pictured	1002100193	Battery Cable Kit
Not Pictured	1002101099	Drive Power Cable Kit

Drive Circuit Parts



Item #	Part #	Description
1	1000108202	Caster
2	1000106302	Limit Switch Plate
3	HB-PH-13	Guide Block
4	1000102004	Retaining Sleeve
5	HB-PH-7-P	PH Lock
6	ELEC-123-2	Limit Switch
7	NA	Brake Connection Terminals
8	1000106450	Drive Control Board (specific to this model/series only)
9	ELEC-627-3R	Brake (Left)
10	ELEC-627-4	Brake Micro switch
11	ELEC-627-3L	Brake (Right)
12	ELEC-826-3R	Electric Drive Motor (Right Side)
13	ELEC-604 & ELEC-871	Horn Button & Contact Block/Base
14	ELEC-551	Joystick
15	ELEC-602 & ELEC-072	Drive Enable Button & Contact Blocks
16	ELEC-826-3L	Electric Drive Motor (Left Side)
17	WHEE-707	Wheel, 10”
18	ELEC-610-2	Hour Meter
19	ELEC-631	Relay
20	WHEE-706 & HARD-001-2	Wheel, 8” & Bearing
(Not Pictured)	ELEC-809	120 Ohm Resistor

Elevate/Lower Circuit Parts



Item #	Part #	Description
1	HYDR-050-3	Hydraulic Pump
2	1000101701	Pothole Bar-R
3	HB-M215-P	Maintenance Lock Pin
4	1000106450	Load Control Module (GP102), Program Specific to this Model/Series Only
5	1002100351	Hydraulic Cylinder Assembly
6	ELEC-647	Angle Transducer
7	HARD-644	Low Friction Cable (E-Down)
8	ELEC-133B	Up/Down Rocker Switch
9	ELEC-635-3	Alarm, Overload
10	ELEC-635	Alarm, Descent
11	1000101601	Pothole Bar-L
12	HYDR-666-1	24V Solenoid
13	1000104401	Pump Mount Plate
14	HYDR-664	18 V Coil
15	HYDR-665	Up Valve
16	HYDR-007-2E	Down Valve with Coil
16	HYDR-007-2E-1	Coil, 24V
16	HYDR-007-2E-2	Down Valve
17	LAS-M115-P	E-Down Valve Actuator
18	HARD-650	Shaft Collar, 7/16
19	HYDR-044-FL-3	Hirschmann Connector with Diode
20	ELEC-648	Pressure Transducer
21	HYDR-600-5	High Pressure Hydraulic Hose
22	ELEC-636	Tilt indicator LED
23	ELEC-636	Overload Indicator LED
24	ELEC-602 & ELEC-871	Lift Enable Button & Contact Blocks
26	ELEC-133B	Up/Down Rocker Switch
27	HB-PH-13	Guide Block
28	1000102004	PH Retaining Sleeve
29	HARD-702	Spring
30	HB-PH-7-P	PH Lock
31	HARD-701	Spring
32	1000106302	LS Plate
33	1000105902	PH Pick-Up Arm
34	LAS-M220-P	PH Arm
35	ELEC-123-2	Limit Switch
(Not Pictured)	(HYDR-032)	Hydraulic Fluid Not available as a replacement part. Replace with Flomite #150, Dexron II, Mobil-DTE 2, or equivalent.
(Not Pictured)	HYDR-625	Pressure Compensated Flow Control Valve
(Not Pictured)	HARD-022	Retaining Ring
(Not Pictured)	ELEC-816	Time Delay Relay

Warranty

LIMITED WARRANTY – Warranty Statement --Outside North America

Custom Equipment, Inc. (the "Company") warrants that all new units of equipment manufactured and sold by it conform to the Company's latest published specifications. Also, that all purchased components and sub-assembled parts and assemblies shall be free from defect in material and/or workmanship for a period of 24 months from the date a new unit is placed into service, with the exception of batteries which are covered by the battery manufacturer for a period of ninety (90) days (pro-rated for one (1) year) on batteries. Further, that all structural components manufactured, purchased, and installed by Custom Equipment, Inc. shall be free of any defect in material and/or workmanship for a period of 60 months from the date a new unit is placed into service.

If the equipment owner/end-user experiences a failure or deficiency within the specified warranty period they must promptly notify an authorized Dealer service repair facility. Custom Equipment's warranty policy requires that ALL warranty claims parts be held for inspection for up to six months or returned to us in a timely fashion if requested. Parts will be requested when we will be returning these parts to our vendor fore credit.

During the Warranty period, Custom Equipment, Inc. reserves the right to replace, repair, exchange, or to provide a new, used, or rebuilt component, assembly, sub-assembly, or weldment at their discretion, dependent upon circumstance, situation, and/or availability. For battery warranty, call the number listed on the battery for further instructions.

This Warranty Policy does NOT cover damage caused by; shipment, misuse of unit (includes operation beyond Factory established limits, loads, and/or specifications), failure to properly service and maintain the unit in accordance with the Company's manuals or Factory Service Bulletins. Custom Equipment, Inc. DOES NOT accept any responsibility for alterations or modifications to the unit, or, damages caused by any natural disasters (such as fire, flood, wind and lightning).

THE PREVIOUS WARRANTY STATEMENT IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

In no event shall the Company be liable for any indirect, incidental, consequential, or special damage (including without limitation to loss of profits, loss of revenue, cost of capital, cost of substitute equipment, downtime, examination fees, claims of third parties, and injury to person or property) based upon any claim of breach of warranty, breach of contract, negligence, strict liability in tort, or any other legal theory. This limited warranty statement recognizes the risks and limitations of product failure between Custom Equipment, Inc. and the Buyer.

This written warranty is also understood to be the complete and exclusive agreement between the parties, superseding all prior agreements, oral or written and all other communications between the parties relating to the subject matter of this warranty. No employee, agent or distributor of the Company, or any other person is authorized to state or imply any additional warranties on behalf of the Company, nor assume for the Company any other liability in connection with any of its products, unless made in writing, dated, and signed by an officer of the Company.